Refrigeration Service Engineer

Vol. 6
No. 2

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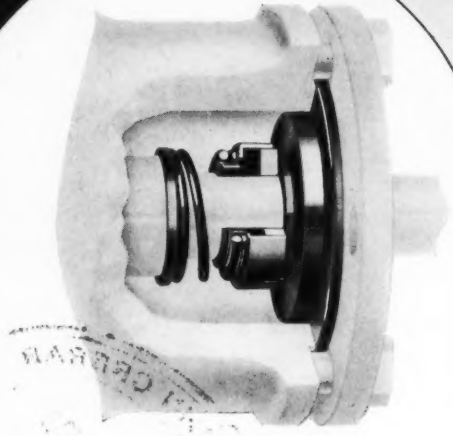

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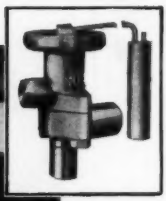

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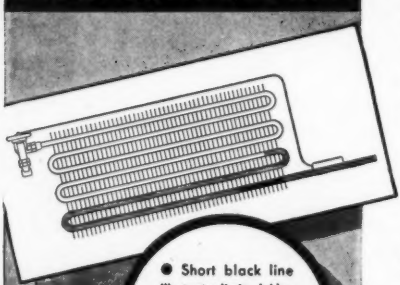

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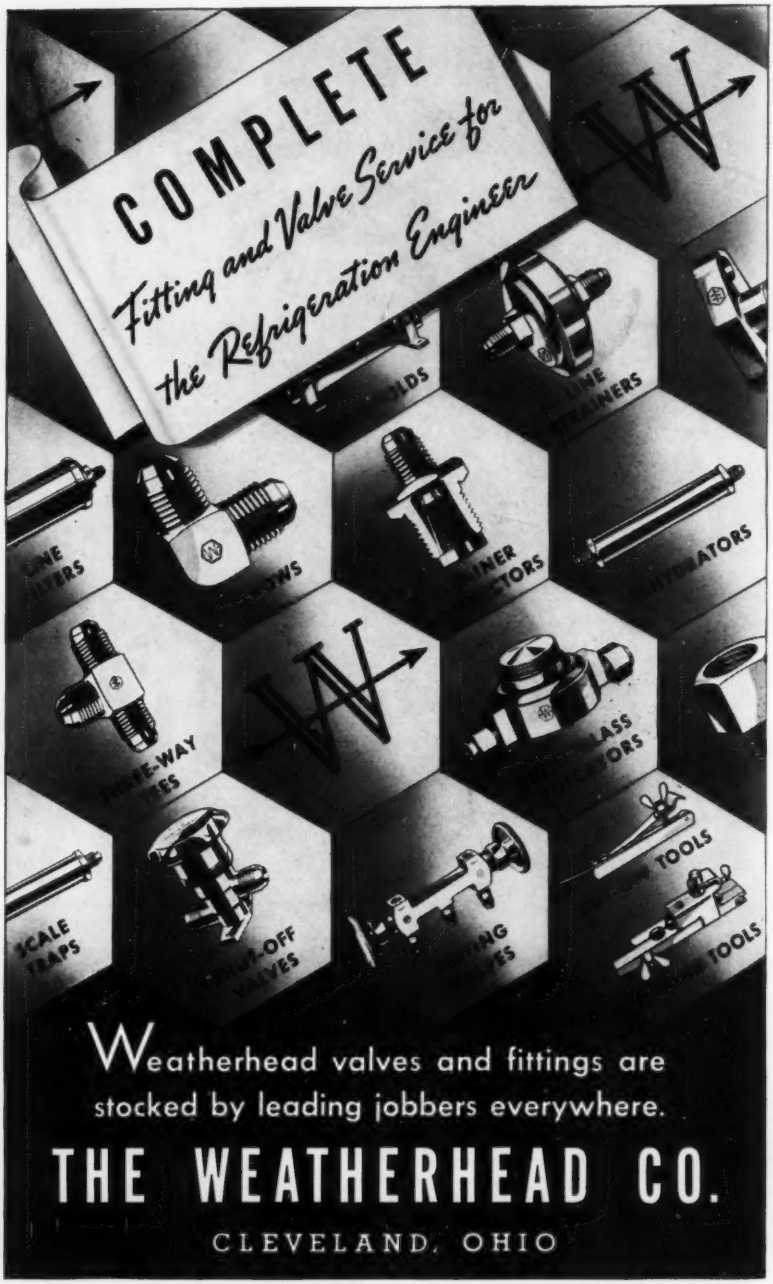
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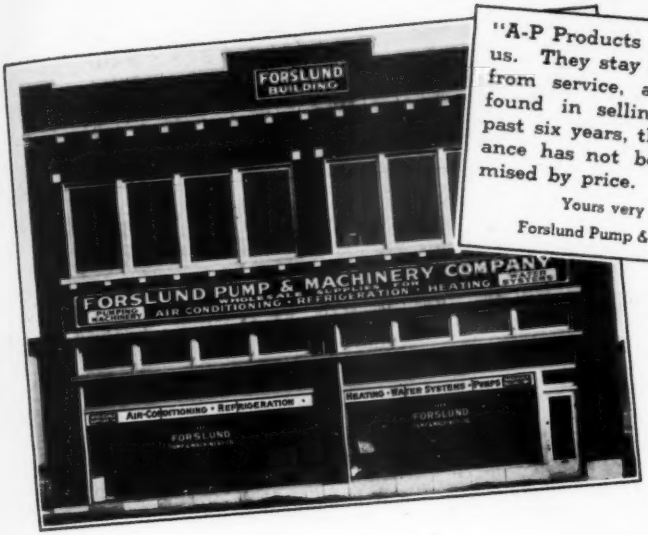

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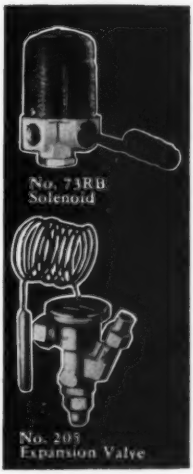

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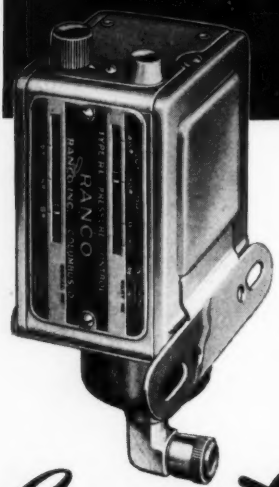

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The Refrigeration Service Engineer

Vol. 6 No. 2

February, 1938

A Monthly Illustrated Journal Devoted to the Interests of the Refrigeration Service Engineer in the Servicing of Domestic and Small Commercial Refrigeration Systems and Oil Burners

Official Organ
REFRIGERATION SERVICE ENGINEERS SOCIETY

Cover

In this unusual picture, several hundred refrigerator units are shown awaiting installation in cabinets at the Erie Works of the General Electric Company. After the completed refrigerators have been tested, they will be shipped all over the United States to fill the ever-increasing demand for electric refrigeration.

Published by
Nickerson & Collins Co.
433-435 North Waller Ave.
Chicago

Telephones Austin 1303-1304-1305

EASTERN OFFICE
149 Broadway, New York City

Telephone Barclay 7-8275

Publishers of Technical Books and Trade Journals Serving the Refrigeration Industries for 46 years.

Subscription Rates United States $2.00 per year. Single copies 25c. All other countries $3.00 per year.

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The Refrigeration Service Engineer

VOL. 6, No. 2 CHICAGO, FEBRUARY, 1938 $2.00 Per Annum

Eighth Article

Air Conditioning

The Carrier Model 50F Summer Room Conditioner

By W. C. FARMINGDALE

THE Carrier model 50F is a portable room conditioner which supplies five phases of air conditioning—namely:

1. Ventilation—60 cubic feet of fresh air per minute.
2. Filtering—all outside air passes through a glass wool filter.
3. Circulation—190 cubic feet of room air is circulated per minute.
4. Cooling—up to 8400 B.t.u. per hour are extracted from the mixture of fresh and recirculated air passed through the conditioner. The amount of heat extracted depends of course on the wet and dry bulb temperature of the air passing through the cooling coil.
5. Dehumidification—(drying)—A certain amount of water is extracted from the air each hour, depending upon the wet and dry bulb temperature.

The unit is equipped with four rubber tired casters. Hence, it is portable in the sense that it can be moved readily from room to room. However, the unit weighs approximately 400 pounds so that it is not really "portable."

The nicely finished sound insulated cabinet houses a ¾ h.p. air-cooled condensing unit, a cooling coil, a filter and two fans (one 60 c.f.m., the other 450 c.f.m.). Because of the well insulated cabinet, the careful compressor suspension and unusual design of the room air fans, the unit is very quiet in operation.

Because the unit is air-cooled, it must be backed up to a window in order to obtain air for condensing purposes. A duct is run from the unit to the window for this purpose.

The unit draws outside air into the machine compartment, passes this air over the motor, compressor and condenser and then forces the now heat-laden air out of the unit into the outside air again. Thus, no water lines need be connected to the model 50F for condensing purposes, because condensing of the refrigerant gas is accomplished solely by the use of outside air.

How the Unit Is Built

Figure I is a line diagram of the unit which shows where the various parts are located inside the unit and how the two air streams pass through the conditioner.

The air duct which extends out the window is divided to form two independent ducts, one the intake air duct, and the other the exhaust air duct. Fresh air flows into the conditioner through the intake duct and

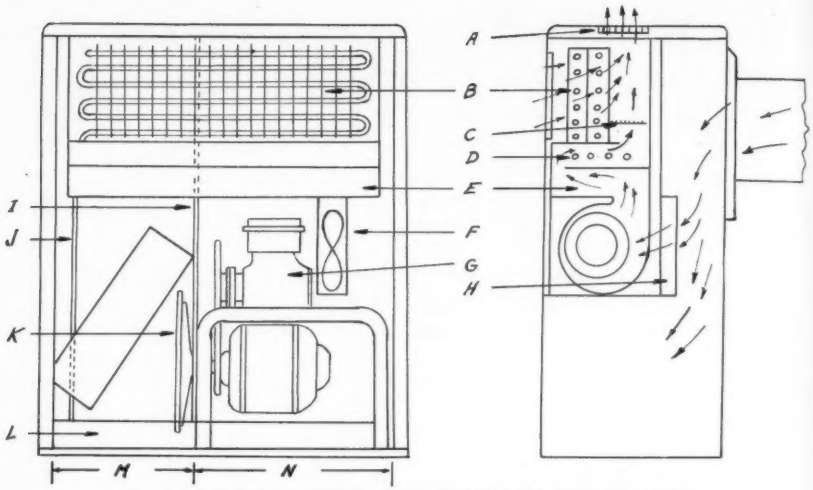


Fig. 1. Rear and side diagram of the Carrier Model 50F Room Cooler.

A—Discharge Grill
B—Cooling Coil
C—Air Nozzles
D—Fresh Air Cooling Coil
E—Silencing Chamber
F—High Velocity Fresh Air Fan
G—Compressor Body
H—Filter
I—Dividing Strip Between Fresh Air and Exhaust Chambers
J—Condensate Tube
K—Condenser Fan
L—Drain Pan
M—Exhaust Air Chamber
N—Intake or Fresh Air Chamber

heated, moisture-laden air passes out of the conditioner through the exhaust duct.

In the side view of Figure I, you can see that the cooling coil (B) and its associated equipment, air nozzles (C) and silencing passages (E) are located near the front of the conditioner so that there is a large space at the rear of the cooling coil. This space is divided by an insulating strip (I) (in the front view of Figure I) to form two independent chambers inside the unit. One of these is called the intake air or fresh air chamber, the other the exhaust air chamber.

The refrigerating machine is located in the space below the cooling coil. The compressor body and the motor are located in the intake air chamber while the condenser and motor fan are located in the exhaust chamber.

The motor fan (K) in the exhaust air chamber pulls about 450 c.f.m. of outside air through the intake air duct through the intake air chamber over the motor and compressor. Then this air passes through the motor fan, through the fins of the condenser and out of the unit through the exhaust air duct. In this way, fresh air is continuously passed through the interior of the machine to remove heat from the compressor, motor and condenser. Thus fresh air flows into the unit through the fresh air duct and heated air passes out of the unit through the exhaust air duct.

Now a small, high velocity fan (F) is located in the fresh air intake chamber alongside the compressor body (G). This small high velocity fan picks up 60 c.f.m. of fresh air from the fresh air chamber, pulls it through a small spun glass filter, (H), and discharges it under pressure into the silencing passage (E). The silencing passages tend to quiet the rush of high velocity air through them. The 60 c.f.m. of fresh air then passes over the fresh air cooling coil (D), where it is cooled before it passes out of the silencers through the high pressure nozzles (C), into the room through discharge grills, (A). Thus, all the air is filtered, silenced, and cooled before it passes into the conditioned room. Because all the air which passes into the room is silenced, street noises are reduced in the conditioned room to the same level as would exist if all windows were closed.

The recirculated room air passes through the conditioner without passing through any fans!

Air under high pressure rushes through the nozzles (C), which are located in back of the cooling coil. As a result of this air rush, a vacuum is created in this area be-

hind the cooling coil. As a result, air from the room tends to rush into the conditioner to fill up this vacuum, but because of the way the cabinet fits around the unit, air can only enter through the recirculation grill in front of the cabinet, through the fins of the cooling coil. The vacuum produced in back of the cooling coil is so great that 190 c.f.m. of room air is drawn through the cooling coil. Here it is chilled before it mixes with the 60 c.f.m. of fresh air and is discharged out of the discharge grill (A), at the top of the unit, into the room.

Thus, the model 50F supplies 60 cubic feet of fresh filtered air to the room each minute and also cools and washes 190 cubic feet of room air per minute. As a result, 250 cubic feet of cleaned, cooled air is supplied to the room each minute.

But how does the 190 cubic feet of room air get washed?

In summer time, the atmosphere contains considerable moisture. This moisture must be removed from the atmosphere in the room before the room can be comfortable. Some of this moisture is removed when the warm, damp air passes over the cold cooling coil. When the warm air hits the coil, it contracts in volume and squeezes out moisture which is left on the fins of the cooling coil. Thus, the fins of the coil become very wet and as more and more air passes through it, condensate water drains from the coil into the drain pan (L). Because the fins on the coil are always soaking wet and are spaced very close together, any dirt or dust that is in the air tends to stick to the wet surfaces and is eventually carried into the drain pan. Thus, the recirculated (room) air although it does not pass through a filter, is effectively cleaned or washed as it passes over the wet surfaces of the cooling coil.

Automatic Condensate Removal Device

In air conditioning work, the removal of condensate (water extracted from the air) is always a problem. Because air conditioning units are seldom located on first floors over basements, condensate cannot drain from the unit by gravity. Hence, in order to remove this condensate (which normally collects at rates exceeding one pint per hour) the average air conditioner must use some form of pump to pump this condensate from the unit into an open sink or toilet bowl.

The Carrier Model 50F, however, gets rid of this condensate without using a pump! And in such a way that the efficiency of the entire air conditioner is increased while the conditioner is ridding itself of condensate! The capacity of the unit when no condensate is in the drain pan is about 1000 B.t.u. per hour less than when the unit is throwing out condensate!

Here is how the automatic condensate removal system operates. (See Figure I.)

The motor shaft has two different diameters. On the larger diameter (close to the motor and bell) the two-groove-belt-pulley is attached. On the smaller diameter (out from the motor pulley) a large fan is attached. This fan is so located that it dips down into the condensate pan and the edge of the fan picks up water from the drip pan and flings it by centrifugal force against the sides of the condenser enclosure (which is totally inclosed). The impact of the water against the sides of the assembly breaks the water up into fine particles and the air passing through the fan picks up these particles of water and spreads them over the condenser. These small drops of water are vaporized quickly by the hot fins of the condenser. When the water is vaporized, it absorbs great quantities of heat from the condenser and thus aids the air passing through the condenser to condense the Freon gas inside the condenser. Then the air stream through the condenser carries the heat-laden vapor out of the conditioner through the exhaust duct into the outside air. For every pound of condensate that is vaporized, 1080 B.t.u. are removed from the condenser. Hence, you can see that when the conditioner is throwing out condensate, the capacity in B.t.u. per hour is increased about 1000 B.t.u. per hour for every pound of condensate that is vaporized each hour.

A further increase in efficiency is obtained in the model 50F by so arranging the condenser that the liquid line from the condenser to the receiver forms a large flat coil on the bottom of the drain pan. Thus, this coil is always submerged in condensate which is normally at about 50° F. Thus, the condensate is also used to absorb sensible heat from the liquid refrigerant after condensation occurs and before the liquid refrigerant is delivered to the receiver which is at the top of the condenser.

Installation

Because the model 50F is entirely self contained and because it is equipped with

casters, the unit can be wheeled into a room and completely installed in about three hours time. The only cutting and fitting that has to be done is at the window connection.

For installation in double hung windows (windows in which both sashes slide up and down in window grooves) the installation can be made quickly with the window connection provided. This window connection is made up of heavy sheet metal about five inches wide by 60 inches long with flanged opening in the center through which the duct can be fastened. On installation in a double hung window, two angles are fastened to either window jamb. Then the window connection piece is cut to one-quarter inch less than the distance between window jambs in such a way that the flanged opening for the duct is in the center of the window. Then the window connection is drilled to fit the holes in the angles which were screwed to the window jambs. Next the window connection is screwed in place with the flanged part of the connection inside the room. Now, the conditioner is backed up to the window, the duct is slipped inside the flanges and the duct is screwed to the flanges. Next a 4-inch by 4-inch angle is screwed to the floor in front of the conditioner and the conditioner is screwed to the angle. This angle prevents the unit from shifting its location on its casters.

Since the motor draws approximately 1000 watts from the power line, the unit can be plugged into any outlet capable of carrying the 1000 watt load provided of course that the outlet is not already overloaded.

Moving the Unit

To move the unit it is only necessary to pull the plug out of the wall, unscrew the duct from the window connection and remove the angle from the floor. Then the entire unit can be readily moved.

The model 50F can be used as a year 'round air conditioner. By simply throwing a switch, the compressor motor can be stopped and the high velocity fan motor alone can be operated. When used this way the model 50F can be used the year 'round to supply the three primary functions of air conditioning, namely:

1. Ventilation (60 c.f.m.).
2. Circulation (190 c.f.m.).
3. Filtering (all outside air).

There are many locations where these three phases are very beneficial. For instance, many rooms have poorly placed heating systems. As a result, one section of a room may overheat before another section gets to a comfortable temperature. If the model 50F is properly located in such a room, the conditioner will actually pull air from all parts of the room and keep the air circulating. This will drive heat to all parts of the room quickly and thus make all parts of the room comfortable. Not only will all parts of the room be properly heated but the 60 cubic feet of fresh air brought into the room each minute will be thoroughly mixed with the warmed room air and sent to all parts of the room.

The Carrier Model 50F is one of the outstanding air conditioning units built today. Later articles will describe outstanding features of units built by other manufacturers.

In next month's article, factors which affect the efficiency of the model 50F will be discussed and later on, instructions for completely disassembling and reassembling the model 50F will be given.

S S S

AIR CONDITIONED STREETS

AN "air conditioned cycle" in which every man will sleep, eat, travel, work, relax and "even walk on the streets" in healthful, comfortable surroundings was predicted by Dr. Willis H. Carrier, founder of the modern science of air conditioning, as a distinct possibility within 20 years.

Speaking before a meeting of the American Institute of the City of New York on "The Future of the Air Conditioning Industry," the chairman of the board of Carrier Corporation, Syracuse, N. Y., said: "Twenty years ago, the art of air conditioning was already contributing to the controlled production of several industries. With the rapid improvements and technological advancements during the last few years, air conditioning has reached a point where business is using it so that everyone can enjoy it. In 20 years man will exist in an air conditioned cycle which may even extend to the streets upon which he walks."

Dr. Carrier explained this would be possible when every enclosure on a busy street had air conditioning and cool air poured out from each one to give the effect of an air conditioned street. He cited a city block in Buffalo, N. Y., which today has enough air conditioned stores and offices on one side of the street to make pedestrians comfortable when doors are opened.

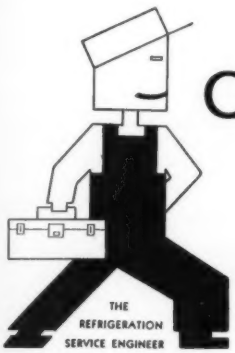
"In the past, air conditioning has been installed largely because it pays," he said. "In the future, we will see the development of the application for personal comfort, health and sustained efficiency in private offices and particularly in homes.

"In the future air conditioning may even have the effect of making winter vacations more popular than summer vacations and in time may radically affect people's habits."

Dr. Carrier pointed out that air conditioning in 20 years would be a greater factor than today in developing desirable office buildings and homes for the public.

"While theatres and stores first introduced air conditioning favorably to the public, the standardization of air conditioning on railroads has been even more impressive as a means of producing public acceptance," he stated. "When persons ride on air conditioned trains, work in air conditioned offices, shop in air conditioned stores, eat in air conditioned restaurants and relax in air conditioned theatres, they are not going to be satisfied until they have air conditioned homes."

The American Institute, the object of which is "the integration of science with social progress" met at the Aldine Club, 200 Fifth Ave. Subjects selected by the Institute for their meetings are those which will have a major effect on American life in the next 20 years.



Building a Combination "U" Gauge and Draft Gauge

HAVING a little spare time the other day in which to play around in the workshop, I decided to build a draft gauge. It is an instrument I have needed for sometime so that I could measure the draft in chimneys while servicing oil burners, or as an aid in determining the pressures or velocities in air ducts.

Having need occasionally of a standard U gauge, also, I thought it a good idea to combine the two, and so set about doing it.

Principle

Before we go into construction details, however, let's study Fig. 1, and see what the principle of this gauge is.

Such a gauge simply permits the difference in pressures to react on the water surface so that it may be observed in a glass U-tube. For example: A glass U-tube is held in a vertical position half filled with water at the same level on each side. If one side of the tube is put into communication through a rubber hose with a chimney or any other partial vacuum area, the water within that side of the tube will rise because the pressure acting on its surface is less than that of the atmosphere acting on the surface of the water on the other side of the tube. The difference in height of the two water columns is the measure of the difference in pressure between the two surfaces. Measured with an ordinary rule, it is termed the inches of water, vacuum or pressure, if pressure is being measured.

In measuring the draft in chimneys, or the velocities in air ducts, etc., the vacuum or pressure, as the case may be, is so slight that it must be read in hundredths, or thousandths, of an inch; therefore, the reason for the draft gauge.

By inclining the tube to a definite angle, we may extend the scale to any length we desire, thus making the horizontal travel of the water column any length we wish for a one-inch vertical rise in head.

Since the readings are most conveniently taken in decimal fractions of an inch, the

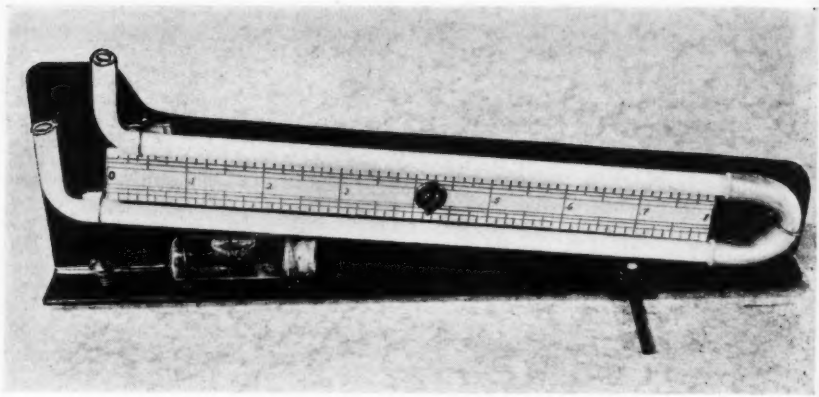


Fig. 1. The assembled instrument shown as used as a draft gauge.

scale is best arranged to read in tenths of an inch and multiples thereof. Therefore, we will give our U-tube an incline of one-inch in ten, as in Fig. 2, and then, for every inch the water column travels in a horizontal direction, we will have one-tenth of an inch vertical rise in the water level.

Caution

Two factors are very important in the use of the gauge, and in its construction, if accurate readings are to be obtained:

(1) The incline of the tube must be as nearly accurate as possible, and to be sure of this point at all times, a level is built into the gauge. In construction of the instrument, care must be taken to insure the proper incline of the tube when mounting it on the base.

(2) The two sides of the tube must not be more than one inch apart, center to center, for a 10-inch gauge, or .8 inch for an 8-inch gauge. If an increase in these centers is made, the vertical rise of the water column will be governed by the volume of water in addition to the pressure exerted on it, and improper readings will, of course, be obtained. A decrease in centers will have no effect.

Construction

All parts of this gauge are made from such material as you may find in your shop, or may be purchased in your neighborhood. Twenty-five to forty cents will cover the cost of all the materials.

The gauge shown in Fig. 1 is an 8-inch gauge, but may be made in any length desired up to 10 inches, using the same scale, providing the angle of the tube is the same. I chose the 8-inch size because the length of the glass tubes I could secure from the local druggist were 10 inches long, which allowed me just sufficient room to make the bends on the end.

Making the Base

For the base (A), I secured a piece of sheet metal 10x3¾x1/16 inches thick, and cut and shaped it as shown in Fig. 3. In making the bend on this base, care must be taken to get the bend perfectly straight since this is going to act as the leveling base, and must be flat to secure accuracy in the use of the gauge. If, by chance, you have to get this piece of sheet iron from your local tinsmith, I would suggest having him make the bend in his bending machine. If you do it yourself, make the bend over a heavy piece of square or rectangular bar iron, which has a straight edge.

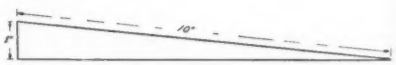


Fig. 2. Angle of tube. Draw to scale on paper, then cut out and use as a template.

For adjustable and collapsible legs (B) so that the gauge will stand on any flat surface and can be adjusted to proper level, secure two round head 3/16x½ inch stove bolts. File out the slot in the head of one, and solder into this a piece of ⅛x3 inch round rod. This, and the other screw, will form a

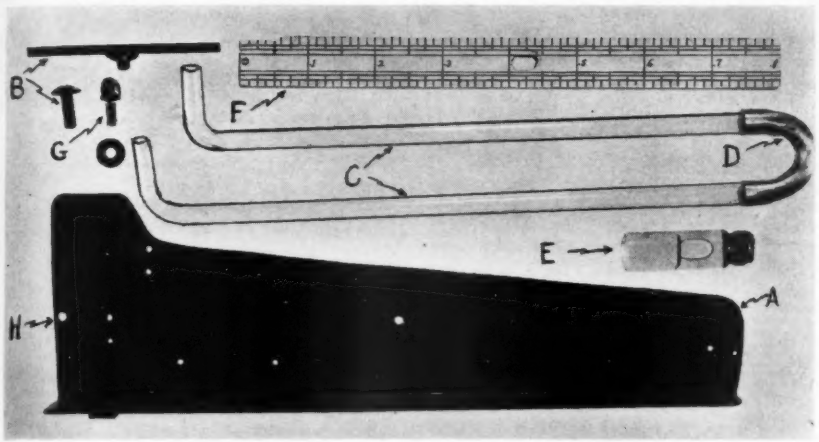


Fig. 3.—Showing the individual parts of the gauge before assembly.

three-point adjustable stand, and should be attached to the base of the gauge as shown. If you do not have a tap of the proper size for tapping the base, solder the nuts of the screws over the holes, allowing about one thirty-second inch clearance in the hole over the size of the screw.

From the druggist on our corner, I purchased two glass tubes and a small round one dram bottle. These tubes are sold as drinking tubes and come in 10-inch lengths, with a bore of three-sixteenth inch, which is just right for our purpose. If you can secure glass tubing of sufficient length and feel that you are good enough at bending glass tubing over a Bunsen burner, this U-tube (C) may be made all in one piece. I found, however, that it is not easy to get this tube in such lengths.

I made the bottom bend of the U-tube (D) out of a piece of three-eighth inch copper tubing. Using an inside bending spring, I squeezed it in with a vise until I had a return bend with about three-quarter inch centers. Bending it outward again, I was able to remove the spring, and then was able to bend it back again the slight amount to the exact centers needed. Using a sizing tool, I sized the ends of the bend for a length of about three-eighth inch.

The two glass tubes should be bent over a Bunsen burner, as shown in Fig. 3. The lower tube will be bent one and one-quarter inches from the upper end, while the other will be bent one and three-quarter inches from the upper end. If you have difficulty in bending glass, the tubes may be left straight with a piece of rubber tubing inserted over the end, and bent upward to take the place of the bend in the glass tube.

I inserted the glass tubes in the copper tube return bend to a distance of about one-quarter inch, and using common cotton string of the grocery store variety, tamped in lightly about three turns to make a watertight packing. Over this joint, I painted on some rubber cement, or tire patching cement, which sealed it against any leakage.

Using the one dram bottle (E) as a level for the gauge, I filled it with alcohol so that it would not freeze if subjected to low temperatures. An air bubble about three-eighth inch long should be left when filling this bottle, and then corked and sealed over the end with rubber cement or any other non-porous cement you may have.

With a sharp file, make a slight cut about one-half inch long around the bottle, halfway between the inner end of the cork and the bottom of the bottle. Fill this cut with black paint as a marker for the level point.

For the scale on the gauge (F), you may use a section of a standard wooden rule, cut to fit between the glass tubes. The scale in my gauge was drawn on a piece of white paper, and then glued to one-eighth inch thick wood. In using the gauge, it will be found easier to adjust the scale to the water column rather than adjusting the length of water column exactly to the scale. There-

fore, this scale should have a hole drilled in the center, and slotted to allow about one-quarter inch longitudinal travel.

In assembling the gauge, you will note that the base is just 10 inches long; therefore, we can lay out our angle for the U-tube directly on the base. Mark off on the small end of the base, a point one-quarter inch from the bottom, and at the large end, one and one-quarter inches from the bottom. Drawing a straight line between these two points, we have our incline of one inch in 10, which is the angle at which the U-tube must incline.

Mounting the U Tube

The U-tube can be fastened to the base at three points, as shown in Fig. 1, by drilling small holes in the base, as near the tube as possible, and inserting U-clamps made from about No. 10 copper wire. The wire is best soldered on the back of the gauge to hold secure. Before fastening the U-clamps on the upper end of the glass tubes, insert under the glass a small piece of cardboard or wood, to a thickness of about one-eighth inch. This will permit sufficient space between base and glass tube for the rubber tube to be attached.

Place the scale between the tubes with the end about one-quarter inch from the copper tube bend, and drill the base to correspond with the slot in the scale. Tap this hole, or solder a nut to the back of the base, and insert a small wing head screw (G). If you are unable to secure a small wing head screw, use any round head brass screw you have and solder into the slot a half round piece of sheet copper, about half the size of a dime. A washer should be used under the head of the screw in assembling your scale.

The level should be mounted in the location shown, and fastened in the same manner as the U gauge with copper wire. Be sure that the level is pulled firmly down against both the back and bottom of the base.

Since this gauge can be used also as a standard U gauge, drill a hole as shown at (H) Fig. 3 about one and one-quarter inches from the bottom of the base, so that the gauge may be hung in a vertical position.

The balance of the equipment will consist of an eye dropper, with which to adjust the amount of water in the tube, and about five feet of rubber tubing, with a 12-inch piece of one-quarter inch copper tubing inserted in one end.

In setting the gauge up for use, place it on a flat surface near the location where the test is to be made. Drill or punch a one-quarter inch hole in the duct or pipe where the reading is to be taken, and insert the copper tube end of the rubber hose in this hole to a sufficient depth so that the pressure will be taken about the center of the pipe. Seal the hole around the copper tubing with putty, or a wad of wet paper.

Level the gauge with the adjustable legs until the bubble on the level is split by the marker on the level.

Fill the U gauge with water so that the end of the column on the lower tube comes as nearly as possible to the zero point on the scale; then, adjust the scale to exactly zero.

Now attach the other end of the rubber hose to the end of the upper glass tube and the gauge is all set for reading.

How to Read It

You will notice that the end of the water column takes a concave or cup shape, and you may be puzzled at first as to how this should be read. I believe the best results will be obtained if the reading is taken at the bottom of the cup.

When using the instrument as a draft gauge, or in a horizontal position, the scale will be read beginning with the zero point and advancing with each graduation equalling .0125 inches. Thus, beginning with .1 on the scale and advancing with each graduation, our readings will be .1, .1125, .125, .1375, .15, .1625, .1750, .1875, .2.

When using the instrument as a standard U gauge, or in the vertical position, water will be added and the scale adjusted until both columns are at an equal height at the 4-inch mark. The scale then will be read as inches, and each graduation then becomes ⅛ inch. The difference in height between the two columns is the pressure in inches of water indicated.

Other Uses

In addition to being able to measure the small vacuums, or pressures, in chimneys or air ducts, many interesting observations may be made with a draft gauge. For example: Relative pressures created by various types of fans, and the difference in pressure at the center and outer edges of the fan.

Filled with mercury, the U gauge may be used to check the accuracy of the vacuum side of your service gauge.

Effects of Moisture in a System

An interesting discussion which took place at the recent convention of the Refrigeration Service Engineers Society. Questions asked by the members bearing on the subject of moisture were answered by Mr. E. W. McGovern of the R. & H. Chemicals Department.

QUESTION: What is the gelatin substance in methyl chloride compressors? What forms it and what is the best method of removal?

MR. MCGOVERN: There are quite a few things that can cause deposits in the methyl chloride systems. The most common cause is the oil. A very high stability oil is required in a refrigeration system.

The second factor is moisture which ultimately will develop an acidic condition, and that condition will promote the decomposition of the oil.

Another factor is, aluminum. You should not have aluminum in a methyl chloride system. It is not so much the factor of forming a jelly in this case as it is the fact that methyl chloride is reactive with aluminum and may form compounds which may be jelly-like substances. One of the compounds is aluminum chloride. It is an undesirable constituent and might make a jelly formation.

Another factor is methyl chloride with acrolein as a warning agent. You will often get a deposit from that type of refrigerant mixture, especially if the system is acidic. A minor cause is the use of gaskets that have soluble constituents in them—you may dissolve enough of those soluble constituents that will go through the refrigeration system and deposit some of this substance.

Question. How about the use of aluminum tubing with Freon?

MR. MCGOVERN: Kinetic Chemicals says that aluminum can be used and is used with Freon. Aluminum does not show the great reactivity with Freon that it does with methyl. However, the system should be dry and free from alcohol; otherwise aluminum which contains magnesium may be attacked.

Question. The system I have in mind was in service about a year and a half, and the gum was all through the compressor crankcase, finally sticking up the pins and the cylinder walls; everything was literally gummed up all over the bottom of the crankcase. Straight methyl chloride was used.

MR. MCGOVERN: Had another refrigerant ever been put in it before?

MEMBER: Not to our knowledge — the original refrigerant was in the machine, and there were no high head pressures and no air.

MR. MCGOVERN: Air is another thing that would promote oil decomposition. I can't understand the condition described unless some oil was put in there by mistake that was entirely unsuitable.

MEMBER: The original oil may have been unsuitable, but it was operated over a year before it went haywire.

MR. MCGOVERN: Oil will not necessarily go haywire right away. If such an oil as castor oil were used, castor oil might slowly change over to something like a mixture of fat or soap.

MEMBER: We tried litmus paper on it to see if it was acetic. It did not show a thing.

MR. MCGOVERN: It would not require a high acidity.

MEMBER: Would not alcohol cause that condition?

MR. MCGOVERN: I don't think alcohol itself would cause that condition. Alcohol might be contributory, in this way: Alcohol very often is added to systems to prevent freeze-ups. In doing that you let the water in the system where it will do damage. We don't think the alcohol itself would cause any damage, but the water in there will.

MEMBER: One large dairy concern in our part of the country was using considerable Freon and also methyl chloride, and they got the bright idea of putting some of this alcohol in the methyl. They found they had a gummy substance sticking on the valves, so they discontinued the use of it.

MEMBER: In that connection, I have been talking with the man from the Ansul Chemical Co., and he tells me they have made a number of tests, using alcohol in the refrigerants, and they find, even though they use alcohol that is supposed to be 100% alcohol, they still get corrosion that takes place on steel, at least, and it appears that using alcohol to prevent mechanical freeze-ups is not a very good idea. It may prevent mechanical freeze-ups, but it does cause difficulty in the matter of corrosion in the sys-

tem. I would say there is no substitute for actually drying the system out and I believe, personally, that a drier is better than using alcohol to prevent mechanical freeze-ups. Of course, if you can have the moisture out of the system at first, that is a good idea, but if it gets in afterwards, then the drier is really required.

Also, in connection with this jelly-like substance, I had the experience myself one time of having methyl chloride in a system that had some sulphur dioxide in it, and it also had some of this acrolein, tear gas, in other words, and that really caused a mess. In fact, we had a rosin-like deposit form in the tubes which was absolutely brittle, like rosin. If you bent the tube you could hear it crack on the inside. It plugged the tube up just as though it were poured full of solder. I believe that is apt to happen if you use methyl chloride with this acrolein in it, and then mix methyl chloride in the system.

MR. MCGOVERN: Methyl chloride itself does not enter into it. It is the acrolein and sulphur dioxide, and that is the well-known reaction. There are companies making resins somewhat in that way.

Question: What chemical will dissolve that substance, or what mixture of chemicals?

MR. MCGOVERN: It so happens that I worked on that material for a year and a half and spent a good deal of my time trying to find a solvent. We know of no solvent for that resin. You can take a strong solution of caustic soda and it will chew it up and loosen it, but it will not dissolve it. I don't know of any solvent.

Copper Plating

Question: How about copper plating?

MR. MCGOVERN: Quite a bit of work has been done recently on copper plating, and that work has just substantiated what was previously supposed to be the cause of copper slating. It traces back to the oil. Petroleum lubricating oils will dissolve metallic copper. It is rather hard to imagine, but you can put a piece of copper in a lubricating oil and heat it up for 100 hours or so, and then actually analyze and determine the exact quantity of copper present. Different oils dissolve different amounts of copper. Generally the more highly refined the oil, the less copper it will dissolve; therefore, the less tendency for copper plating.

There are numerous secondary factors, such as moisture in the system, alcohol, possibly the type of refrigerant and particularly heat which will promote the dissolution of the copper; that is, the decomposition or the electrolytic action which causes the copper compound in the oil to plate out on the metal surface. Heat is perhaps the most important factor, because you generally find copper plating on hot surfaces or surfaces where there is rubbing, where the compound has a chance to decompose. The compound formed is presumably a complex organic compound.

Where It Forms

It forms on the bearings—the seal nose, sometimes. It is particularly troublesome there. It will eventually promote leakage. On the cylinder walls is another place it will cause a lot of trouble. It may cause the piston to jam, or the copper may scale off and block up a valve, and sometimes on the valves you will find copper plating.

Question: What can be done to keep the compressor from copper plating? What can be done to prevent it?

MR. MCGOVERN: Use a high grade oil, highly refined oil, an oil recommended by the machine manufacturer, and keep the system free of air and moisture. Keep the system clean. Have just refrigerant and high grade oil in the system and you should not get copper plating.

Question: In some methyl jobs that have had a calcium drier, when we tear the machine down, we find a great deposit of something that looks like a copper coating all over the inner part of the compressor. Can you give me any idea as to what happened?

How about overheating of the drum in the charging of the job—the idea of playing a torch on the drum to charge through the head of the machine?

MR. MCGOVERN: You speak of a reddish deposit as being in the crankcase?

Question: The rings look like bronze or copper when you take them out. Also, the inner part of the compressor will have a bronze coating.

MR. MCGOVERN: That is a copper plating condition. The way to eliminate that is to use a good grade of lubricating oil and keep the system free of air and moisture and other contaminants.

Question: What is the action of methyl chloride where you overheat the drum?

MR. MCGOVERN: Methyl chloride is very stable thermally. Heat alone unless you reach 600° or 800° Fahrenheit, will not start to decompose methyl chloride. If you have

moisture present, that is something else.

You should not heat a drum, for other reasons. You may blow out the fusible plug, and then you have a flame there, and an inflammable gas.

Another reason is that in those cylinders the steel may be harmed by the action of the torch. When we get a cylinder returned that shows it has been heated, we have to retest that cylinder. If the steel has been harmed, we have to scrap the cylinder.

Question. What is the action of Freon in the case of heating of the drum?

MR. MCGOVERN: You could say exactly the same thing for Freon as methyl chloride, except in the case of the fusible plug; it would not burn.

Question. I have a letter in my files, and their suggestion was on that copper coating that it had been caused by overheating of the drums in the Freon drums but not in the methyl.

MR. MCGOVERN: It is possible they figure that this copper plating is perhaps accelerated by an acidic condition. That is why I stated your system should be free of moisture, because moisture develops an acidic condition.

One way to develop an acidic condition is to heat the refrigerant. But it is my belief that Freon manufactured with a sufficiently low moisture content, and which shows a sufficiently high thermal stability, that ordinary heating to a reasonable temperature, 400 degrees or so, would not develop any acid in the refrigerant. The same applies to methyl chloride. If you have very strong local superheating at some point, and get your cylinder almost red hot locally, then you might get decomposition, and that might quite possibly accelerate copper plating.

Question. In some of these systems, with a calcium drier on, we found the calcium liquidized and went into the system and ate the needles up.

MR. MCGOVERN: I assume you mean calcium chloride. Calcium chloride is water soluble. Other ordinary driers, such as calcium oxide, activated aluminum, barium oxide and others, are essentially insoluble. However, calcium chloride is soluble, and if you get an extra heavy shot of water through the drier it will dissolve some of that calcium chloride, instead of the calcium chloride absorbing it, and that brine will go into the system, and calcium chloride brine solution is corrosive. Salt water solutions are corrosive. If you have ever lived around the seashore you know what corrosion is from salt water. In cold storage plants, where they circulate brine, I believe they add an inhibitor to the brine solution to prevent corrosion such as sodium dichromate.

Question. What could we use other than evacuating the job to eliminate that condition? After the calcium went into the job and is corroding the needles, what could be used to counteract that condition without evacuating it?

How to Avoid Corrosion

MR. MCGOVERN: You should do more than evacuate it. Thoroughly clean it out. You will probably have to flood it out with water. Water is the only common solvent that will dissolve calcium chloride effectually. Then wash the system out with methanol (methyl alcohol) to take the water out; then blow out the system with air to get most of the alcohol out. Then evacuate it, and if you have any spots where the alcohol tends to collect, heat those spots, pull a good high vacuum on the system over a long period of time, then charge in clean oil and clean refrigerant, and put a drier on.

Question. Do you recommend using alcohol in the system for a drier?

MR. MCGOVERN: I was referring to the use of alcohol to flush out the system. Alcohol will not act as a drying agent in the ordinary sense. It will act only as an anti-freeze. Its use for this purpose in refrigeration systems is patented. We don't recommend its use, because you leave the water in there. It is just like having continuous headaches and taking aspirin tablets to relieve the pain but not getting at the basic cause of the trouble. If you use alcohol as an anti-freeze follow it with a drier.

Question. We have some companies who recommend that.

MR. MCGOVERN: I think if you study the recommendation, it is with Freon jobs, particularly. Water is very insoluble with Freon. A very small trace of water will separate out of the Freon and block the valve. That amount of water may be so small that it may not cause any particular trouble from the standpoint of corrosion, but it will cause trouble in these freeze-ups, so if you add a little alcohol, it will prevent the freeze-ups. But I would say you should never add alcohol without at the same time putting a drier on the system to take out the water which is in there.

Servicing the McClellan Refrigeration Unit

Sixth Article—Continued from January

By L. K. WRIGHT, M.E.

Removing Charge from System

TO remove the charge of ammonia from system, attach a purge hose to valve (11), with free end of hose immersed in a pail of water and open valve (11). After pressure has been released, start machine by opening water inlet valve (17) and keep running until both gauges read "zero," which will show that all pressure is out of the system. Allow purge hose to remain in fresh water an additional 15 minutes to insure complete purge.

The purge hose should be carefully watched at this point to prevent syphoning of water into system due to the rapid absorption of ammonia. Should this happen close valve (11) promptly.

Cleaning Scale Trap

The scale trap (13) catches any scale which may become loose by the expansion and contraction of the piping and prevents the scale from reaching the valves. This trap should be cleaned after machine has been in operation a short time and at intervals of about one year thereafter.

To clean trap pump down the suction line by closing valve (6) and pumping gas into the condenser until gauge (20) shows a vacuum of ten inches, then close valves (1) and (3). The scale trap can then be removed and cleaned.

After scale trap is replaced, open valve (1) and attach purge hose to valve (11) to purge air out of system. The machine should be started and run until a vacuum of at most 30 inches shows on gauge (20), after which valve (11) should be closed and valves (3) and (6) opened thus restoring the system to normal operation.

Oil Renewal

The oil in the compressor crankcase should be renewed once each year for most satisfactory operation. To do this, after machine is stopped, valves (1) and (3) (see Figs. 5, 6 and 7) should be closed, the purge hose attached to valve (11) and the ammonia gas purged from the compressor by opening valve (11). The purge hose should then be connected to valve (38), and the gas purged from crankcase by opening valve (38), after which valve (8) should be opened slowly and the old oil completely discharged.

Valve (12) should then be opened slightly for a moment and the oil blown from the bottom of condenser over into crankcase. This should be *cautiously* done in order to avoid running liquid ammonia into crankcase. Care must be taken to see that valve (12) is closed tightly and that no grit has been caught under valve seat and is causing it to leak—which would be shown by the escape of ammonia gas from valve (8) or valve (38).

After oil has been completely removed, close valve (8), remove valve (38) and fill crankcase through the opening with Polar Ice Machine Oil as made by Standard Oil Company. The plug on the crankshaft stuffing box should be removed to allow air and gas to escape from crankcase while oil is being run in. After crankcase is filled, replace plug on stuffing box and replace valve (38), using litharge and glycerin paste on the threads of both. Then close valves (8), (38), (10) and (11) and open valves (1) and (3) and the machine is ready to operate.

Amount of Oil Required

The amount of oil required in crankcase is as follows:

For a No. 2 machine....	2¾	pints
For a No. 3 machine....	4	pints
For a No. 4 machine....	10	pints
For a No. 5 machine....	16	pints
For a No. 6 machine....	16	pints
For a No. 7 machine....	16	pints

No other oil should be used in the crankcase than that specified—it is dangerous to use substitutes.

Lubrication

The compressor cylinder and bearings inside of crankcase are lubricated from the oil well in the crankcase. The main bearing alongside of flywheel carries a grease cup, which should be kept filled with a good grade of cup grease, a can of which is supplied with the machine.

The self-oiling bearings on each side of idler pulley at belt should be filled at intervals, using same oil as for motor bearings.

Water Drains

Provision has been made so that all water-cooled parts can be drained. If the machine is placed where the cooling water may freeze and it will not be operated for several days, do not fail to drain the condenser, compressor cylinder and water switch to prevent freezing and bursting while they are not in use. This should be done by opening valve (18) and removing plug (81) and cap (80), or opening pet-cocks provided at these points.

DATA ON OLD UNITS

Machine Number	5	4	3	2
Capacity, tons ice melting effect per 24 hrs.	1	½	¼	1/7
Floor space, required by base	5'9"x 2'9"	3'8"x 2'1"	3'8"x 2'1"	3'7"x 1'7"
Overall height	3'11"	3'1"	3'1"	3'1"
Weight, complete with motor, lbs.	1641	1000	550	450
Compressor bore, inches	4	3	2	1⅝
Compressor stroke, inches	4	3	2½	2
Cylinders	1	1	1	1
Compressor, r.p.m.	180	200	285	300
Flywheel diameter, inches	30	21	19¾	14½
Flywheel face, inches	4	3¼	2¾	2¼
Ammonia circulated, lbs. per hr.	41	20	10	5½
Ammonia charge, lbs.	25	18	10	3
Oil in crankcase, pints	16	10	4	2¾
Belt length, endless	11'9"	9'0"	8'0"	6'7"
Belt width, inches	4	3	2½	2
A. C. Motor, h.p.	2	1	½	⅛
A. C. Motor, r.p.m.	1165	1725	1750	1725
A. C. Motor pulley, diameter, in.	4½	4	3	2½
A. C. Motor pulley, face, inches	4½	4	3	2½
A. C. single phase fuses, 220V	35	20	15	10
A. C. 2 or 3 phase fuses, 220V	20	15	10	10
A. C. 2 or 3 phase fuses, 110 V	40	30	20	20
D. C. Motor, h.p.	3	1½	½	⅛
D. C. Motor, r.p.m.	1100	1200	1675	1800
D. C. Motor pulley, diameter, in.	5	3½	3½	2½
D. C. Motor pulley, face	4½	4	3	2½
D. C. Motor fuses, 220V	15	10	5	4
D. C. Motor fuses, 110V	30	20	10	8
Approx. current consumption, W/Hr.	1870	1220	520	380
Gal. Water per hour, average	60	40	30	15
Heat transfer, B.t.u./Hr.	12,000	6000	3000	1700

Instructions, Care and Operation of the Later McClellan Models

The later models of McClellan units consisted of a compressor (CP), belted to a motor (M), the operation of which was controlled by water switch (S). The condenser (C) and receiver (R) in this type were mounted side by side in a vertical position, as may be observed by reference to the illustrations which follow, Fig. 7. In these illustrations all parts are provided with letters or numbers, so that the individual sections or adjuncts may be identified.

The low pressure (LG) and high pressure gauges (HG) are not shown in the top view of the unit, but the positions of both these gauges are shown in the side view. The low pressure gauge (LG) was not attached to the machine proper, for the installer of the apparatus would insert a tee in the suction line, with a ¼ inch steel stop valve, to accommodate this low pressure gauge (LG). Like any other compression system, these gauges were referred to when checking operating conditions. The same chart method as given previously may be used to check for correct operation.

These later models were provided with idlers, which consisted of a free arm, under a spring tension (SP). A grease cup at the arm bearing and two oil holes at the idler pulley bearings required attention periodically. The spring tension of the idler should be light enough to prevent jumping of the belt, but not tight enough to strain the belt.

Regulating Amount of Water

Water entered the condenser (C), then passed to the compressor head and finally through the water switch (S). The flow of water through the machine was restricted by means of the water outlet valve (18) to such an extent that the head pressure registered on the high pressure gauge (HG), did not exceed 185 lbs. A pressure of 150 lbs. was considered a good average.

Flow of Refrigerant and Water

The diagram (Fig. 9) indicates by dotted lines the direction of the ammonia gas and

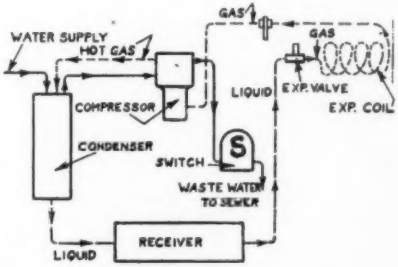


FIG. 9

by broken lines the direction of ammonia liquid through the machine and coils. Solid black lines indicate the direction of the cooling water through the system.

Water Outlet Valve

After water outlet valve (18) was adjusted so that the machine operated in the proper manner, this valve was left at that particular setting and the machine stopped and started by operating the water inlet valve (17).

The proper quantity of water that should pass through the machine cannot be stipulated in advance, but is determined upon the individual installation and by the water and power rates.

Again, if the high side assembly is located in the basement, with the evaporating coils some floors above and a considerable distance away, the low head pressure operating condition secured by using a great deal of cooling water may be inadequate to force the liquid ammonia to the evaporator and the pressure will have to be increased to the proper point by cutting down on the water outlet valve (18).

To Start Machine

The starting and stopping of the manually operated machine requires the opening or closing of valve (17), the water inlet valve. The manipulation of this valve is identically the same as turning the valve of a radiator on or off, or in opening or closing a faucet. Open the water inlet valve (17) fully, so that water passes through the condenser (C), compressor head and water switch (S). It will require a few minutes to fill all of these parts, after which the pressure will actuate the electrical switch (S) and start the machine.

By closing water outlet valve (18) for a moment water pressure would build up quickly and start the machine quickly. Just as soon as the machine started, this valve (18) should be opened promptly to its original setting, to permit circulation of the proper quantity of water.

The control of the unit is based on the water supply and is accomplished through the water switch (S). The compressor should never be started except by means of water pressure on this switch and with water outlet valve (18) open to permit circulation of the proper quantity of water through the machine.

Motor

Motors rarely gave trouble, although in some installations it was found that the motors were operating under overload conditions. Motors should be kept free from dirt, etc. and properly oiled; the oil level inspected at 10-day intervals and kept at the proper height. It is advocated that every six months the oil be completely renewed.

Water Switch

The water switch is an automatic type provided with a pressure-adjusting nut. The pressure at which the switch will throw can be governed by this adjusting nut. If turned to the left, the switch will throw at a lower water pressure; if turned to the right, it will require increased water pressure to operate. The switch on each machine was adjusted at the factory to throw on a water pressure of five pounds per square inch—it should not be changed unless absolutely necessary.

Installation, Testing and Servicing

The installation, testing, servicing and operating conditions of the later units follow the original instructions given for the earlier types.

DATA ON THE NEW OR LAST MODELS

Machine Number	7	6	5	4
Capacity, lb. ice melting effect per 24 hr. operation	4,000	3,000	2,000	1,000
Floor space, as required by base	5'9"x 2'9"	5'9"x 2'9"	5'9"x 2'9"	4'7"x 2'2"
Height, over top of unit	6'6"	4'4"	3'11"	3'10"
Weight, with motor	2,000	1,800	1,750	1,005
Compressor bore, in inches	4½	4½	4½	3
Compressor stroke in inches	5	5	5	3
Compressor speed, r.p.m.	250	200	125	200
Flywheel diameter, in inches	32	32	32	21
Flywheel face, in inches	4	4	4	3
Ammonia charge, pounds	45	35	25	18
Oil in crankcase, pints	16	16	16	10
Belt length, endless	11'9"	11'9"	11'9"	9'0"
Belt width, in inches	4	4	4	3
A. C. Motor, h.p.	5	5	3	1
A. C. Motor, r.p.m.	1750	1750	1165	1165
Pulley diameter, in inches	4½	3¾	3¼	3½
Pulley face, in inches	4½	4½	4½	3½
D. C. Motor, h.p.	5	5	3	2
D. C. Motor, r.p.m.	1700	1700	1200	1200
Approx. water per hr., gals.	120	90	60	50
Heat Transfer, B.t.u./Hr.	24,000	18,000	12,000	6,000

Failure to Start

The machine will not start for any of the following reasons:

a. Water not circulating through machine, although water valve (17) is open, due to supply line being shut off at a point nearer the water main. A plugged condenser or compressor head filled with scale or deposits will also result in failure to start.

b. Water pressure is not sufficient to operate water switch. See "To Start Ma-

chine" and "Water Switch Adjustments."

c. Fuses blown in service box, or at machine, so motor is not supplied with current.

d. Motor may be out of order.

Valves

The ammonia valves on an installation are under pressure. Carefully check a valve and know it is functioning before manipulating it.

All pipe is extra heavy, where ammonia is concerned. All water pipes and fittings are standard galvanized.

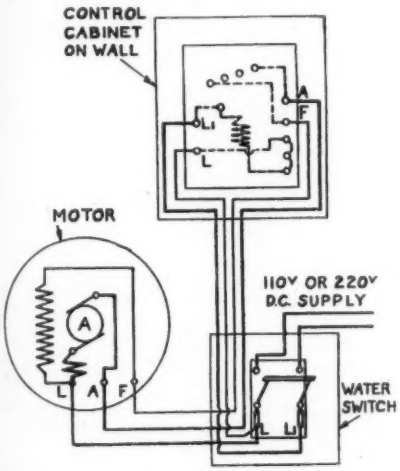


FIG. 10

Coils

All McClellan coils used on all units save the twin cylinder were one inch extra heavy, welded pipe, galvanized to protect against rusting.

On the two cylinder job coils were of 1¼ inch extra heavy galvanized stock.

Note that the later models, Machines No. 5, 6 and 7, used the same compressor, but operated at different speeds. Changes were made in receiver and condenser vessels only.

These compressors had two inch diameter crankshaft, flywheel weight 250 lbs. and the condenser used a spiral coil of steel pipe, having 2600 sq. in. of surface, welded within a steel shell. They can only be cleaned by pouring a rusticide through the coil to remove rust and deposits.

Some of the older models were equipped with a pop or blow-off type of safety valve, connected to the condenser. These valves were provided with a ⅜ inch hole, sealed by a special disc which ruptured at 300 lbs. per sq. in. The outlet side of this valve was piped to the outside of the building with standard ½ inch galvanized pipe, the discharge or open end being provided with a return bend or gooseneck to prevent rain from entering. The discharge pipe was carried at least six ft. above the level of the roof. New regulations or codes in various cities may require changes in this type of safety device.

Where direct current motors were to be used, an electric starter was installed on the wall near the motor and connected as indicated in the wiring diagram shown in Fig. 10.

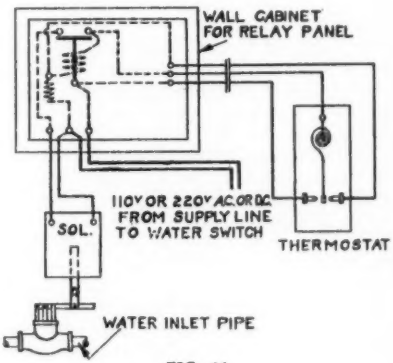


FIG. 11

This starter automatically connected the proper resistance in the motor circuit to prevent the fuses from blowing, due to the rush of current and then as the motor speed increased this resistance was automatically cut out.

For a.c. motors the automatic motor starter was not required and the across-the-line type of starter is employed. The remainder of the automatic starting equipment consists of a thermostat located in the refrigerator and a solenoid-operated water valve controlled by a relay connected with the thermostat. This solenoid valve served to supply or shut off the water and thus stop and start the machine.

A diagram of the above mentioned equipment with wiring is shown in Fig. 11.

Head Pressures in Air-Cooled Machines

By GEO. H. CLARK,* B.S.M.E.

AIR-COOLED condensers some years ago generally consisted of a large coil of copper tubing. In a good many instances the volume of this copper tube was sufficient so that it might be used as a receiver for the condensed refrigerant as well as for the condenser itself. In this case, care had to be exercised to see that too great a quantity of liquid was not used in the system. If the quantity of liquid in the system is too great, a large part of the condenser tubing may be filled with liquid and thereby the actual condenser surface is decreased; and this will require a higher condensing temperature and pressure in order to remove heat at a fast enough rate. The rate at which heat may be passed from the refrigerant to the cooling medium depends on several things. These are: the temperature difference between the condensing refrigerant and the cooling medium, the rate of motion of refrigerant and cooling medium, and the amount and effectiveness of heat transfer surface between the refrigerant and cooling medium.

In considering air-cooled condensers we can make a study of the factors which affect the head pressure or condensing pressure in an air-cooled refrigerating machine.

Table I shows a number of different conditions used to illustrate the various things which may affect the condensing pressure. Case "A" is taken for a normal air-cooled refrigerating machine where the temperature of the air at the condenser is 75 degrees. The suction pressure is taken as 20 pounds absolute and for approximate figures we are assuming a 15 pound atmospheric pressure which will give us a five pound gauge pressure as our suction pressure at the compressor.

We are considering an air-cooled condenser having a heat dissipating surface of four square feet. With the particular machine and condenser and an air circulation at the suction pressures given, we find that the temperature at which the refrigerant condenses is 20 degrees higher than the air temperature.

Column (6), then, gives the condensing temperature which is the sum of the air temperature as given in Column (2) and the temperature difference between the air and condensing refrigerant as given in Column (5).

Under Column (7) we have the head pressures given as gauge pressures which would obtain in sulphur, methyl and Freon systems.

Case "B" shows a lower air temperature at the condenser with all other conditions as before and shows the head pressures that are obtained with the various refrigerants at that new condition.

Case "C" shows the head pressures that would be obtained if the air temperature at the condenser was raised to 90 degrees with all other conditions as before.

Cases "D," "E," and "F" show the conditions that would be obtained if we doubled our absolute suction pressure and otherwise duplicated the conditions of cases "A," "B," and "C."

With a doubled absolute suction pressure the compressor will force approximately twice as much gas into the condenser per hour which will require twice the difference in temperature between the condensing refrigerant and the air so that whereas the temperature difference was taken as 20 degrees in the first three cases, it is considered as 40 degrees in the latter three cases.

Cases "G," "H," and "I" show the conditions that would be obtained in conditions identical to cases "A," "B," and "C" except that the size of the condenser was reduced to one-half of the original size.

The temperature difference with the 20 pounds absolute suction pressure and a condenser having two square feet of surface will then be 40 degrees which gives us the same condensing temperatures as in cases "D," "E," and "F." In this, however, we have normal quantities of refrigerant condensed in the condenser but we have a condenser of one-half the normal size.

* Chairman of National Educational and Examining Board, R.S.E.S.

In cases "J," "K," and "L" we show what happens when our suction pressure is high and our condenser surface is low. In this case our condensing temperatures are extremely high even when the temperature of the air is comparatively low.

In cases "M," "N," and "O" we show the results which would be obtained if we doubled the size of the normal condenser with the normal suction pressure. In this case the temperature difference between the condensing refrigerant and air over the condenser would be one-half that with the normal size condenser.

In cases "P," "Q," and "R" we have again doubled our condenser surface to make it four times the original condenser surface. In this case the temperature difference between the condensing refrigerant and the air would be reduced to only one-quarter of condenser than normal. In all of these cases the circulation of air over the condenser is considered the same.

If the condenser having four square feet of heat transfer surface were to cost $1.00, in the same proportion a condenser having two square feet of surface would cost $.50. The saving from case "A" to "G," then, is only $.50 while a comparison of head pressures in these two cases indicates that the compressor will have to work considerably harder to compress the gas to the extra high pressures with the result that the machine will have a higher power demand with the small sized condenser.

Without doubt, this increase in head pressure would cause such an additional power consumption that the cost of operating the machine over a few months' time would more than offset the original cost of the condenser.

TABLE I

1	2	3		4	5	6	7		
		Suction Pressure					Head Pressure		
Case	Air Temp. at Condenser	Absolute Lbs.	Gauge Lbs.	Sq. ft. of Condenser Surface	Temp. Diff. Air to Refrig.	Condensing Temp. (2+5)	S	M	F
A	70°	20	5	4	20°	90°	56	86	100
B	50°	20	5	4	20°	70°	35	58	70
C	90°	20	5	4	20°	110°	82	118	135
D	70°	40	25	4	40°	110°	82	118	135
E	50°	40	25	4	40°	90°	56	86	100
F	90°	40	25	4	40°	130°	120	160	180
G	70°	20	5	2	40°	110°	82	118	135
H	50°	20	5	2	40°	90°	56	86	100
I	90°	20	5	2	40°	130°	120	160	180
J	70°	40	25	2	80°	150°	170	212	232
K	50°	40	25	2	80°	130°	120	160	180
L	90°	40	25	2	80°	170°	237	288	315
M	70°	20	5	8	10°	80°	45	72	84
N	50°	20	5	8	10°	60°	26	48	58
O	90°	20	5	8	10°	100°	70	102	117
P	70°	20	5	16	5°	75°	40	65	77
Q	50°	20	5	16	5°	55°	22	46	52
R	90°	20	5	16	5°	95°	63	95	108

the original amount or five degrees and the head pressures would be as indicated under Column (7).

A comparison of head pressures that are obtained then, between cases "A," "B," and "C" with "D," "E," "F" shows how the increased suction pressure will increase the head pressure if no other conditions have been altered. A comparison of cases "A," "B," "C" with "G," "H," and "I" shows how the head pressure may be increased with a decreased amount of condenser surface with all other conditions being equal.

A comparison of cases "D," "E," and "F" with "J," "K," and "L" shows how the head pressures will vary when we have abnormally high suction pressure and a smaller

Of course, the actual cost of the condenser to the manufacturer will probably be not more than one-quarter of the cost of that condenser to the customer so that whereas the actual saving to the manufacturer is $.50 per condenser, the saving to the customer would be about $2.00 per condenser.

If the machine operating cost will be increased as much as $2.00 in from one to two years' time, it would appear that the saving in original cost is more than offset by the increased operating cost so that it would not be economical to use the smaller condenser.

Working in the same manner, if we consider cases "M," "N" and "O" we have doubled the size of our original condenser which will double the cost to the manufacturer

and, in other words, will require an outlay of $2.00 instead of $1.00. The difference in cost of these two condensers to the consumer will be approximately $4.00.

The head pressures are less in case "M" than in corresponding case "A" where the normal size condenser is used. If the lower head pressure in this case reduces the operating cost over a period of from one to two years' time by $4.00 or more, it would indicate that the increased condenser size was an economical proposition. However, in general, if the decreased power cost does not equal $4.00 in two years' time, it is doubtful whether or not it would be considered economical to use the larger condenser.

It will be noted that the condensing pressure in case "A" was 86 pounds gauge with methyl and in case "G" exactly identical except that the condenser surface has been cut in half, the head pressure was increased to 118 pounds, or was increased by 32 pounds gauge. However, when we doubled the size of condenser, our head pressure was reduced from 86 pounds to 72 pounds gauge as shown in case "M." This shows a reduction in head pressure of only 14 pounds.

This reduction of 14 pounds in head pressure was obtained through an increased cost to the customer of $4.00 while the increased head pressure of 32 pounds was accompanied by a saving to the customer of only $2.00 so that it shows that if the condenser becomes larger and larger, the reduction in head pressure diminishes while the cost climbs rapidly.

In case "P" we find that our head pressure for methyl is 65 pounds gauge while the cost of the condenser to the manufacturer would be $4.00 as compared to $1.00 in case "A."

Difference in Cost

The difference in cost between the two condensers to the customer would be $12.00 for four times the difference in manufacturer's cost. However, the reduction in head pressure was only seven pounds gauge so that the decrease in suction pressure undoubtedly would not cause a $12.00 decrease in power consumption in a good many years and, consequently, it would be uneconomical to use the condenser having such a large surface area and, consequently, high cost.

A further factor which can affect the condensing pressure on an air-cooled refrigerating machine, of course, is the rate of air circulation by the condenser. In this case, however, it is doubtful if we can say the temperature difference between the condensing refrigerant and the air will be exactly an inverse proportion to the rate of air circulation. However, we can say that as the rate of air circulation by the condenser goes down, the head pressure goes up.

The study of the head pressures indicated shows what we can have with a normal sized condenser under normal operating conditions head pressures varying between 58 pounds and 118 pounds when the temperature around the condenser ranges from 50 degrees to 90 degrees.

In some cases, of course, the temperature around the condenser may go either higher or lower than the temperatures indicated so that our head pressure would be still lower or higher than these pressures. In considering the condenser having less than the normal amount of surface we can, of course, obtain this condition with the normal size condenser if the refrigerating system is so filled with refrigerant that the receiver is full of liquid and there is still sufficient liquid to fill approximately one-half of the condenser coil. If the condenser is half filled with liquid, it means that the actual part of the condenser which is acting as a condenser is the part in which we have a mixture of liquid and vapor. So that an extra amount of refrigerant in the machine will also cause high head pressures as indicated in cases "J," "K" and "L."

Causes of Increased Pressure

With still more refrigerant in the system the pressures might go considerably above the pressures indicated. An increase in head pressure may also be due to air or other noncondensable gases being drawn into the refrigerating system, or it may be caused by a mixture of refrigerants.

The head pressure, then, with the compressor operating properly will increase as the suction pressure increases. It will increase as the air temperature over the condenser increases. It will increase as the effective condenser surface is decreased, or it will increase as the rate of air circulation over the condenser decreases. So that all these things must be taken into account when considering whether or not the head pressure on a machine is normal.

A normal head pressure in one case may be abnormally high or low in another case so that air temperatures, size of condenser, air circulation and also whether or not the condenser surface is partially blocked by dirt must all be considered and, of course,

the refrigerant that is used also affects the condensing pressure. All of these conditions or variations of pressure are obtained with a normally operating compressor.

If the compressor is not operating properly, these conditions may be altogether altered.

A decrease in volumetric efficiency of our compressor in general will lower the head pressure with all other conditions normal. In general, if the refrigerating system is low on liquid refrigerant, the condensing pressure may be lower than would otherwise be normal.

The pressure at which the refrigerant is condensing as well as the suction pressure at the compressor may indicate whether our system may be low on refrigerant or have sufficient refrigerant or our pressures may indicate abnormally low air velocities by our condenser or our head pressure may indicate a partially plugged condenser or one in which the fins or tubes on the condenser are dirty.

When the compressor is operating properly, it may be possible to get more ideas as to whether or not the system is low on refrigerant or has excess refrigerant provided that all other conditions are normal. However, if the compressor has low volumetric efficiency or is running at a slower speed than normal, it is not possible to have a definite indication as to whether or not a system is properly charged with refrigerant from the pressures at which the machine is operating.

Amount of Heat Dissipated

For natural air circulation by a condensing coil approximately two B.t.u. can be passed from the condensing refrigerant to the cooling air per square foot of effective condensing surface per degree difference in temperature between the condensing refrigerant and cooling air, per hour.

With a forced circulation of air, five to ten times this amount of heat may be passed from the condensing refrigerant to the cooling air with the other conditions being equal.

Heat may be passed from a liquid to a metal surface at a considerably greater rate than from a vapor to a metal surface; or, heat may be passed from a metal surface to a liquid at a greater rate than from a metal surface to a vapor. For this reason a water-cooled condenser is considerably more effective per unit of effective area than is an air-cooled condenser.

In using air as a condensing medium, an economy can be effected by using a finned tube in the condenser. In this case the area of the fins is very nearly as effective as the area of the tube itself provided that the fins have a good metallic contact to the condenser tube. This finned tubing is only an economy in passing heat from a tube surface to a vapor. If the condenser is water-cooled, there is no purpose in having fins on the tube, as the water would remove heat at very nearly the same rate from bare tubing as it would from the finned tube. In general, the fins of finned tubing are effective if the fins are maintained at a temperature very nearly the same as the condenser tubing itself, or if they are maintained at a temperature between the temperature of the tube and the cooling medium. If water were used as the cooling medium, the fins would be maintained at approximately the same temperature as the water and would thus be ineffective.

General Construction

Finned tube condensers may be made using one continuous tube, or they may be made with a bank of parallel tubes. In general, the tubes are horizontal for most refrigerating condensers although there is no reason why a vertical finned tube condenser may not be used where the tubes are in parallel. A continuous tube coil should have its tubes horizontal due to the fact that as the refrigerant condenses in the condenser, a certain amount of liquid heat might obtain in each loop of the coil if the tubes were vertical. This would cause an unnecessary trapping of liquid refrigerant in the condenser and would tend to cause erratic action. Where finned tube condensers are used, the tube volume is usually comparatively small as the proper amount of effective surface is obtained by use of the fins. Therefore, the condenser cannot be used as a liquid receiver and in practically all cases a liquid receiver is used in conjunction with this type of condenser. Exceptions to this are the capillary tube and in some cases the high side float type of refrigerating systems.

The tube size in an air-cooled condenser should be large enough so as not to produce an appreciable drop in pressure through the tube, but since the refrigerant is under its highest pressure in the condenser, its volume is comparatively small and a large tube is not necessary. In fact, a small size tube requires a greater rate of flow of vapor re-

frigerant through the tube which tends to make the heat passage from the condensing refrigerant to the tube slightly greater per square foot per degree of temperature difference than is the case with a low velocity of refrigerant through the tube. However, the small diameter tube requires a greater length to obtain the same cooling surface, so there is a practical limit in each direction. For household refrigerating systems of not more than one-quarter horsepower, a condenser tube of one-quarter or five-sixteenths inch outside diameter is sufficiently large.

Forced Circulation of Air

With respect to the forced circulation of air by the condenser, in a good many cases the air is forced through the condenser by the fan and in some cases the air is drawn through the condenser by the fan. Each method has its advantages and disadvantages. Forcing the air through the condenser will usually give a high velocity of air directly in front of the center of the fan and for a small area directly around that point. However, this high velocity has some disadvantages. One of these disadvantages is that the high velocity air which has more or less intermittent motion due to the number of fan blades and rate of rotation, will cause a noise to be set up as it passes by the finned tubing of the condenser. Another disadvantage is that this high velocity of air has a tendency to collect lint and dust on the condenser surface at the point of maximum velocity, thereby decreasing the effective surface.

An induced draft or suction fan causes a more uniform spread of air velocity over the entire condenser but does not cause such a high velocity of air in any one place as does the forced draft fan. The induced draft fan is especially effective where a hood or shield is employed over the fan so that the air moved by the fan must be drawn through the condenser and not from out around the tips of the fan blades. A study of the air circulation by a fan may be made very simply by blowing smoke around a fan in rotation. The same idea may be used in studying the flow of air through a condenser coil with either forced draft or induced draft fans.

The receivers used in conjunction with the condensers depend to a large extent upon the type of refrigerating system the condensing unit is to be used with for their size. If the machine is to be used with a domestic refrigerator using an expansion valve, a thermostatic expansion valve, or any type of low side which does not use much refrigerant, the receiver may be comparatively small, although it is usually advisable to have the receiver large enough to hold the entire charge of refrigerant in the system. If the machine is to be used in conjunction with a multiple system, the receiver should be large enough to hold the full charge if dry-type evaporators are used. If flooded-type evaporators are used, the receiver capacity will usually not be large enough to hold the entire charge but the flooded-type evaporators should include shut-off valves so that the evaporators may be closed off with their refrigerant supply contained in them. All receivers used in refrigeration should be constructed in accordance with the A.S.M.E. code.

S S S

WINERY CONTROLS FERMENTATION HEAT BY MODERN COOLING METHODS

HEAT generated by fermentation during wine making is controlled today in the C. Coppo and Son Winery at Mira Loma, California, by year 'round cooling apparatus built specially for this industry.

A Carrier compressor driven by a 15 horse power motor distributes the cooling compound to a double-pipe, stainless steel wine cooler. This cooler was found to be essential because the varying quantities of water and sugar in the grapes each season led to a problem of temperature control during fermentation.

It was found that by correct cooling methods the winery was able to produce the equivalent of a five-year old wine in one year. Another advantage was in the facilitation of wine shipping to Eastern markets.

S S S

CORRECTION

IN the caption for the front cover of the November issue, showing the refrigerated R.S.E.S. emblem, we stated the sign was designed and built by Mr. Gammon, of the Copeland Refrigeration Corp.

This statement is in error. The sign was designed by B. G. Hyatt, service manager of Copeland. Mr. Gammon assisted in its construction.

S S S

Marshall W. Porter
Massachusetts

Here is my renewal for another year. I find the article very interesting.

The Question Box

Readers are invited to send their problems pertaining to the servicing of household refrigerators and small commercial refrigerating equipment as well as oil burners to "The Question Box."

COMMENTS ON QUESTION 238

"THE Question Box: I read the January issue of the REFRIGERATION SERVICE ENGINEER with great interest. I was particularly interested in question 238 in the 'Question Box' on the subject of 'Changing from Ammonia to Methyl.'

"I wish to take this opportunity of cautioning all service engineers against using aluminum coils originally installed for ammonia with methyl chloride refrigerant. To the writer's knowledge several very serious accidents have occurred as a result of this.

"It seems that aluminum tubing which had been used with ammonia and then later used with methyl chloride is subjected to a chemical action. The result is that within the tubing there is a formation of tri-methyl-aluminate. I also understand that this chemical is known as liquid fire. Loosening a connection of a machine in which aluminum tubing was used in a change-over may result in liquid fire emanating from the loosened connection and burning the operator. I do not know whether methyl chloride will act this way to aluminum tubing when new, and I am sending a copy of this letter to Mr. McGovern of R. & H. Chemicals for his opinion.

"I am merely cautioning the men as a large number of aluminum tube evaporator coils are out in the field being used with ammonia.

J. Askin, Chief Engineer,
Fedders Manufacturing Co., Inc.

Mr. J. Askin: You are correct in your statements to the effect that neither old nor new aluminum equipment should be used in contact with Methyl Chloride. While we have never heard of serious accidents from this source, we have heard of some minor accidents and agree that a serious accident could happen.

I would suggest the name "Tri-Methyl Aluminum" or "Aluminum Tri-Methyl," rather than "Tri-Methyl Aluminate."

E. W. McGovern,
Chlorine Products Division.

CORRECTION TO QUESTION 239

"THE Question Box: Question 239 appearing on page 28 of the January, 1938, number of the REFRIGERATION SERVICE ENGINEER contains this statement: 'We would like to change this job over to get the added efficiency possible with Freon.' We did not know that added efficiency might be obtained by the use of Freon over and above that obtained by the use of any other type of refrigerant. May we suggest that an article embodying the relationships of the efficiencies, both theoretical and practical, of the three refrigerants, Sulphur Dioxide, Freon, and Methyl Chloride, would be extremely timely and very informative.

"In the answer to this same question we find the following statement: 'Neither of these gases are troubled with corrosion due to moisture or to the possibility of small amounts of sulphur dioxide being present.'

"Contrary to the foregoing and to quite generally accepted beliefs, all refrigerants will, in the presence of moisture, produce corrosion provided a sufficient quantity of moisture is present. Some time ago we carried out a comprehensive study of the moisture limits for the three commonly employed refrigerants and embodied the results of that study in a report published in the Ansul News Notes. We are pleased to enclose a copy of this report, in which you will find illustrations proving our contention that all of the refrigerants will corrode metal provided sufficient moisture is present. Any or all of these experiments may be duplicated by anyone interested in so doing.

"In changing over a sulphur dioxide job to methyl chloride it is quite necessary that all of the sulphur dioxide be removed from the system in the event acrolein methyl chloride is to be used in the machine subsequently. The presence of a small quantity of sulphur dioxide in acrolein methyl chloride produces gummy deposits which will eventually stick up a refrigeration system."

Walter O. Walker, Research Dir.,
Ansul Chemical Company.

ALCOHOL IN SYSTEM

QUESTION 240. I would like to have your comment on using anhydrous alcohol in commercial jobs using methyl chloride as the refrigerant. Also, the amount and the method of putting it in the system.

ANSWER: In my opinion, putting anhydrous alcohol in the methyl chloride commercial system is equivalent to giving a lame system a temporary crutch.

By so doing, you are preventing moisture from freezing at the expansion valve, but you are not removing any of the moisture, and, therefore, are not overcoming the cause of corrosion occurring at these valves and other points.

We have many good dehydrating apparatuses on the market, at this time, and there are several good dehydrating agents, which in my opinion are far better to use, thus removing the moisture entirely, than using a means of just preventing the moisture from freezing at the valve, such as you are doing with anhydrous alcohol.

I cannot recommend the use of this in any way.

WILL METHYL IGNITE OF ITS OWN ACCORD?

QUESTION 241. I would like to know if you have ever heard of methyl chloride igniting of its own accord while being purged at the compressor head after the system has been dried out with activated alumina.

I don't like to use calcium chloride, as it is so very hard on expansion valves. What would you recommend to use in place of calcium chloride and activated alumina?

ANSWER: I have never heard of methyl chloride igniting of its own accord, under the conditions described by you, nor under any other conditions of normal use with recognized drying agents.

Methyl chloride will, of course, burn, but only under rather exact conditions where the proper amount of air is mixed with it. By continuous slow purging in an enclosed space where an open flame is burning, it is possible to reach this condition and cause the gas to ignite. The ignition in such a case, I believe, would take the form of a slow flash spreading over the entire space, and would last for only a few seconds. The use of a drying agent would have no effect on this condition one way or the other.

Two additional dehydrating agents that I can think of at present are calcium oxide and "Drierite." The first of these—calcium oxide—I don't believe would be of any advantage since it has practically the same weaknesses as calcium chloride. "Drierite" from all reports, is very satisfactory, and should do the job without the disadvantages you mention.

CHARGING THERMOSTATS—HIGH SIDE FLOAT SYSTEMS—OIL POCKETS

QUESTION 242. During the past few weeks, I had eight service calls, and in six of these calls, I have found that the bellows on the cut-off switch lost its charge. In each case, I have had to replace a complete new switch. Is there a way of recharging these bellows on the premises without replacing new switches? The models I refer to consist of Norge, Ice-O-Matic, and Frigidaire. I am sure all readers will appreciate more information about same.

In charging a high side float system, does the size and type of float affect the amount of refrigerant or not, and what is the best way of determining the amount needed? Is it advisable to let in more gas during the hot days so as to minimize running time?

What is the best way of avoiding an oil pocket, also known as an oil condition job?

ANSWER: Due to the highly specialized data and equipment necessary for the recharging of thermostat power elements, it is not possible, or rather practical, for the service shop to attempt to do this work. The difficulty in locating and repairing the extremely small leaks that occur in these devices, and then the very close limits of gas charge required, makes the entire job entirely too costly to attempt.

However, in the case of all Ranco thermostats, and I believe some others, you may obtain replacement power elements for these thermostats from your jobber, which is considerably cheaper than replacing the entire thermostat or endeavoring to recharge the old one.

The size and type of float in a high side float system should not make a noticeable difference in the gas charge, though possibly a small difference will occur due to the difference in the amount of gas required to raise the float ball.

To determine when a high side float system is fully charged, proceed as follows: With a high and low side gauge installed, allow the machine to remain idle for about five minutes in order to permit the condenser to cool. Purge the top of the con-

denser sufficiently to insure no air at this point. Also, purge the top of the float through the purging valve for this purpose. Attach the drum of gas and add slowly and intermittently, until frost appears on the suction line at some point outside the cabinet, where it can be easily observed. Allow the machine to run long enough, say five or ten minutes to allow the charge to settle, thus determining whether the frost was just a surge back, or whether you really have sufficient gas in the system. If the frost line stays fairly even during this time, you may be sure the charge is sufficient. In order to prevent a continual dripping from this line, purge a small amount of gas from the high side of the system until the frost line disappears. A very important part of the operation of adding or purging the gas in these systems is to add or purge a small amount at a time, permitting sufficient time between each (about five minutes) for the charge to adjust itself in the system, thus showing a true indication of its state. Purging should always be done from the high side. The first job of this kind will probably require quite a lot of time, but with observation on one or two of these units, you will learn to judge the amounts of gas at each shot more accurately, and thus speed up the work. A change in the amount of charge should not be necessary for different seasons.

Classification

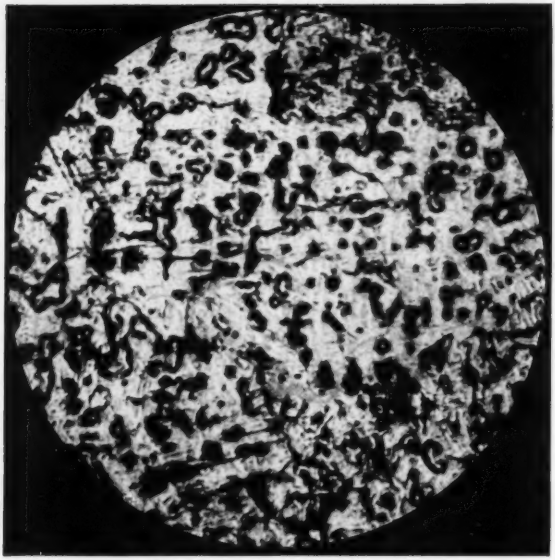
Most oil condition jobs occur in flooded type systems, with the exception of those caused by too much oil in the system. Practically all these cases are due to one of three causes: Too much oil in the system; insufficient gas in the system; or to improper calibration of float. On the different types of systems, I would say these troubles were as follows:

The few cases that will occur apart from those described, cannot be generally classified, and will usually require a special analysis and correction peculiar to each.

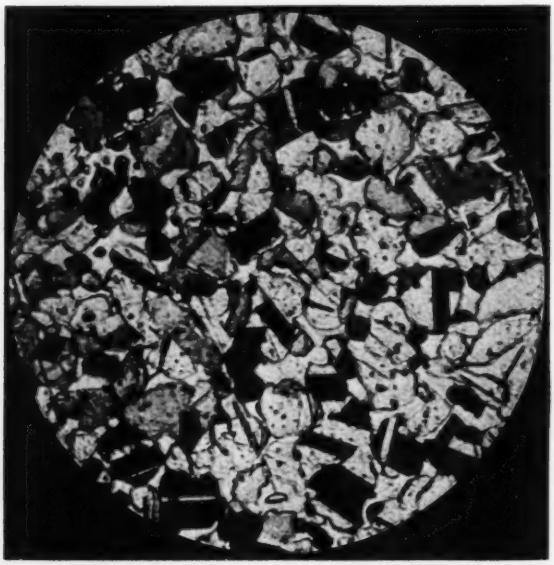
LAPPING SEALS

Question 243. I wish to know the best way to lap seals, both the bronze and hardened ring. At present, I lap the end of our bronze journal on glass with a ground surface, and as a lapping compound, I use what is called "alumina"—a Norton product. This is a fast-cutting compound and yet, I sometimes wonder if it doesn't load up the bronze to some extent and have a tendency to continue to cut and score the ring, especially if the bronze happened to have some minute porous cavities to retain some of the compound after lapping. I also burnish the surface upon a hard-polished surface to check-up the flatness of the surface, which gives me a mirror finish. For a long time I used pumice stone, which has a tendency to lose its cutting qualities, but for some unknown reason, I have a hard time to lap flat, the proof showing up very distinctly when I burnish. While pumice to start off with, seems coarse, it soon rubs to a fine, smooth compound. Could you advise me of a better method? While I have lapped thousands of seals, I am open to advice and willing to learn. I also try to be very thorough in cleaning after lapping. It seems there are only three grades of pumice. I use the fine. We use a standard Rotary Seal ring, and most of the time, I have to relap them after coming from the factory. We find many that are not flat and dare not trust them too far. Whether they are seasoned improperly and warp between factory and my place, I do not know. I do not care for the effect from radial lapping. Hand work is much more satisfactory. I use standard lapping plates—

System	Cause	Remedy
High Side Float...	Too much oil in system.....	Pump down entire system. Drain oil to proper level. Repeat two or three times.
	Insufficient gas, allowing blanket of oil on top of gas if SO_2	Add gas.
Low Side Float....	Too much oil in system.....	Drain oil to proper level. Then proceed as in High Side Float System.
	Float calibration too low.....	Replace float assembly or calibrate to proper height.
	Low on gas.....	Add gas.
Direct Expansion System.....	Too much oil in system.....	Drain to proper level. Repeat after several hours operation.



Microphotograph showing extremely dense, close grained, molecular structure of Fedders Drop Forged Valve Bodies assuring proof against seepage leaks.



Microphotograph showing coarse grained characteristics of cast valve body as contrasted to impervious density of Fedders Drop Forged body.

Microphotographs by Pittsburgh Testing Laboratory
Magnified 150 Diameters

Microphotographs

SEE HOW FEDDERS EXTRA QUALITY.....

DROP FORGED VALVE BODIES

ELIMINATE SEEPAGE LEAKS

● There can be no such thing as seepage leaks, thanks to Fedders DROP FORGED brass valve bodies. Look at these microphotographs and see the contrast between the close grained metal structure of Fedders DROP FORGED valve bodies and that of coarse grained cast valve bodies.

The micro-photograph at the left shows the dense, homogeneous structure of Fedders DROP FORGINGS. The high forging pressures produce valve bodies of such compact molecular structure that they are absolutely impervious to penetrating refrigerant gases from the inside and moisture from the outside.

Other Extra-Quality features include exclusive interchangeable power element, bellows, tube and bulb assembly, high vapor charge providing positive control through the entire temperature range, hermetically sealed power element housing, convenient, sensitive adjustment without the use of tools, moulded housing, push pin and guide insulating body from power element.

Refrigeration men in every part of the world have proved and approved Fedders Model 33 Thermostatic Expansion Valves by 5 years of on-the-job performance on thousands of installations. Sold by Representative Suppliers everywhere.

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BUFFALO, NEW YORK

Atlanta - Boston - Chicago - Cincinnati - Dallas - Detroit - Los Angeles - New York - Philadelphia

ARE YOU GETTING YOUR COPY OF THE FEDDERS NEWS?

cast iron with criss-cross grooves.

I use powdered Carborundum for first operation, alumina oil for second, and then clean off my second operation plate, wash and dry, then burnish my rings by using a very small amount of dry alumina on this second plate, thus obtaining a mirror finish, proving very satisfactory. I would appreciate any suggestions you might offer.

Now, I wish to inquire concerning copper tubing and how I can make close bends with ⅜-inch tubing, the same as they make on condensers, with about ⅝-inch or ¾-inch spacing between, and not collapse at the bend. Can you suggest certain tools or jigs for this purpose? I don't know if this is a secret of the trade, but there seem to be numerous companies doing this operation. I surely would like to know about this and the type of tools used. This means a great deal to me, and I hope you can help me out.

ANSWER: Your procedure, as described by you, for lapping seals and seal rings, is correct in every detail to the best of my knowledge.

I believe, though, that your trouble in procuring a flat surface is more likely to be due to the lapping block than to the lapping compound. Ground surface cast iron lapping blocks, I believe, are far superior to glass, and it is well worthwhile putting sufficient money into these tools to insure a good grade when you are buying them. For the finer finishing of surfaces, I believe the plain smooth face blocks are better than the criss-cross groove type. In either case, blocks should be bought in pairs, and frequently lapped together to avoid hollows or worn spots in the blocks. It is also a good plan to keep one block for proving or burnishing the surface, while the lapping is done on the other.

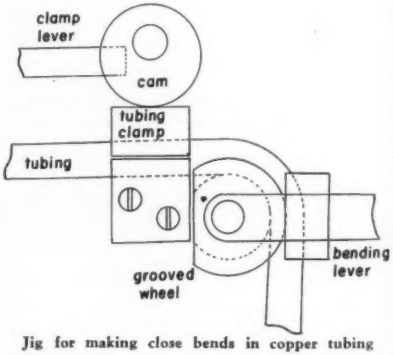
Lapping Compounds

There are so many good compounds on the market that it is difficult to make any definite recommendations. However, there are several things which should govern your selection.

A fast-cutting compound will be found suitable for roughing down steel rings, which will be finished on a finer compound. I don't believe that a fast-cutting compound should ever be used on bronze.

Compounds should always be mixed with oil in preference to water. I believe that all compounds used for this purpose should be such that within five minutes or so after installing and running, the compound used, and which may become lodged in the surface, will dissolve and wear itself out, thus avoiding the possibility of cutting grooves in the surface. There are such materials on the market.

In lapping the seal, the motion should be in a large sweeping circular motion across the face of the seal, rather than in a rotating motion remaining in one spot on the lapping block. The seal should be frequently turned a fraction of a turn during the process.



Jig for making close bends in copper tubing

I don't know of any manufacturer who merchandises the type of bending jig you are interested in. The type of jig is basically the same as those used for making larger bends, but is usually of a stationary type, mounted on a bench. The diameter of the grooved wheel determines the radius of the bend. For such close bends, the jig, of course, must be well made with less tolerance than those for larger bends. Manufacturers requiring them usually make their own, or have them made by a tool maker according to their specifications. They vary of course, in minor details, but are essentially as shown in the accompanying sketch.

S S S

Russell I. Merizan
California

As to what I think of THE REFRIGERATION SERVICE ENGINEER, it's the best trade publication I've found.

Arthur H. Williams
Pennsylvania

Please find enclosed check for $2.00 for subscription to The Refrigeration Service Engineer. Thank you for so fine a magazine.

NEW MECHANICAL DEVICES
Service Tools and Special Equipment

Under this heading there will be published illustrated descriptions of new or improved service tools and equipment for the Service Engineer. Information contained in this department is furnished by the manufacturer of the article described and is not to be construed as the opinion of the Editor.

NEW BONNEY REVERSIBLE RATCHET HANDLE

BONNEY FORGE & TOOL WORKS, Allentown, Pa., has just announced the addition to their line of a new reversible ratchet handle for 3/8-inch square drive sockets and attachments, to be known as No. T35.

It is light in weight, strong and perfectly balanced. In order to keep out all dust, dirt, grit and grease the ratchet has been fully enclosed.

REVERSIBLE RATCHET HANDLE

The 3/8-inch lug makes it adaptable for use with all 3/8-inch square drive sockets and attachments. On the other side of the head is a 1/4-inch square opening for use with 1/4-inch adaptors or for use on small compressors, motors, shut-off valves, etc.

Made of Bonney 'CV' Chrome-Vanadium Steel, chromium plated and highly polished, it has a round knurled handle which insures a firm, comfortable grip.

It will be a useful addition to the kit of any mechanic who uses 3/8-inch square drive sockets. Complete information may be obtained by writing to the manufacturer.

NEW VOLTAGE-CORRECTING TRANSFORMERS FOR REFRIGERATORS AND OTHER APPLIANCES

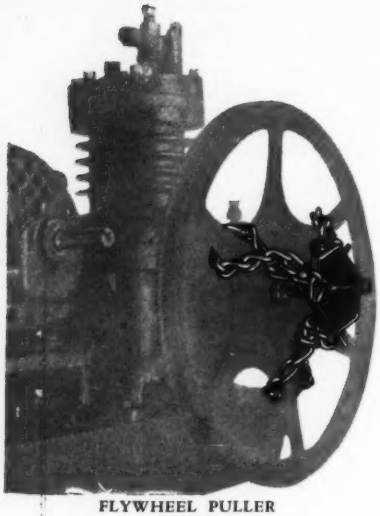
FOR those localities and conditions where electric circuit voltages are below the correct value for electric refrigerators and other appliances, the Jefferson Electric Company of Bellwood, Ill., have designed voltage corrective transformers which provide the desired voltage for most efficient operation. These transformers are completely housed in neat crackle-lacquer finished cases, each provided with an 8-foot length of all-rubber cord and attachment plug for connection to any lighting circuit receptacle. The plug of the refrigerator cord is accommodated by a receptacle mounted flush with the case, thus transmitting current of the desired voltage to the electrical appliance. A switch permits selection of three different voltage taps, with an "off" position for disconnecting. The back has a keyhole slot for easy mounting. Where the voltage is too high the transformer can be supplied to step it down.

VOLTAGE-CORRECTING TRANSFORMER

FLYWHEEL PULLER

THE Perfection Chain Type Flywheel Puller is a convenient tool for pulling compressor flywheels. It can be used on shafts from the smallest size up to and including one inch in diameter, and is ideal for pulling flywheels of odd or even spokes of any number or shape.

Electrically welded links of heavy duty chain are capable of withstanding severe service without parting. Threads of screw are cut sharply and accurately to assure easy, positive action.



FLYWHEEL PULLER

The chain supporting prongs are specially hardened and rigidly set in casting and are constructed so that they will not bend under stress or strain.

The body of the tool is machined from a special cast malleable iron material, and in the field has withstood the most severe tests.

This wheel puller is most attractively priced, and any information concerning it can be secured from the Perfection Refrigeration Parts Company, Harvey, Ill., manufacturer of a complete line of replacement parts for popular makes of refrigerators including Frigidaire, Kelvinator, Servel, Universal, Copeland, Zerozone, etc. This company also manufactures a complete line of water regulators, tools, brass valves, fittings, and accessories.

THE "E-Z" WIRE STRIPPER

A NEW and very useful tool, recently placed on the market, is the "E-Z" Wire Stripper, manufactured by the Pyramid Products Co., 2224 S. State St., Chicago, Ill.

Simple, satisfactory and as easy to operate as a pair of pliers, this tool will strip the insulation from any wire, solid or stranded, from No. 12 to No. 30 gauge.

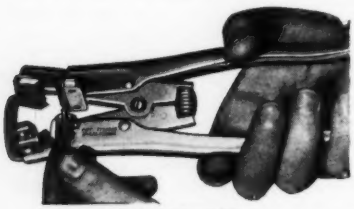
It is suggested that you send a sample of your wire when ordering. One of three sizes of tools can be supplied as follows:

No. 1 for 12 to 18 gauge—3 stripping holes.

No. 2 for 10 to 16 gauge—3 stripping holes.

No. 0 for 20 to 30 gauge—6 stripping holes—only upon order when insulation is over .050 inch.

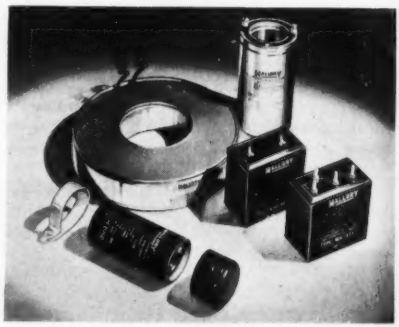
Write the manufacturer for further information.



WIRE STRIPPER

MALLORY A.C. MOTOR CAPACITORS

P. R. MALLORY & CO., Inc., announces a complete line of motor starting capacitors designed to service all replacement needs. The entire line consists of 106 units, only 22 of which are required to serve 90 per cent of the field applications. Nine "universal" units may be satisfactorily used on a wide variety of replacements even though they do not duplicate the original capacitor in physical appearance. All units incorporate latest construction improvements which insure long life and dependable service.



MOTOR CAPACITORS

A special folder, with more than 160 replacement listings by motor make and model number, will be sent on request. It also tells how to determine proper capacitor to use, how to install, how to test, and other valuable servicing information.

REPUBLIC ELECTRIC TO CONDUCT MEETING

THE Republic Electric Company of Davenport, Iowa, who are wholesale refrigeration supply jobbers, are to hold a refrigeration supply meeting at the Blackhawk Hotel on February 25, for their dealers and servicemen. There will be displays and talks by factory engineers and representatives on their new 1938 line of refrigeration supplies and equipment. All dealers, servicemen, engineers and R.S.E.S. members are invited to be present at this meeting.

KEROTEST ANNOUNCE NEW VALVE

DUE to popular demand, Kerotest Manufacturing Co. is now manufacturing an angle valve, Catalog No. 4451-S, with a 5/8-inch solder connection at the side outlet and a bottom inlet of 1/2-inch male pipe. Former valves of this size all had S.A.E. flare connections at the side outlet.

HARRY ALTER ST. LOUIS STORE IN NEW LOCATION

THE HARRY ALTER CO. announced recently the removal of their St. Louis store to its new location at 2910 Washington Ave. Mr. Irving Alter in making the announcement, stated:

"Our new location is 5,000 square feet and we have a stock large enough to cover the requirements which our customers in St. Louis and the surrounding territory place.

"Our larger quarters give us better facilities to handle the increased business we have secured in the past year. The door front is on a through business thoroughfare and in a centerly located business section, in a modern, one story building with modern shipping facilities. Our St. Louis branch is in charge of Mr. B. F. Anthony—'Tony' to the service men in St. Louis."

CHICAGO-WILCOX MFG. APPOINTS NEW EASTERN REPRESENTATIVE

THE Chicago-Wilcox Manufacturing Co., makers of gaskets for all purposes, announced recently the appointment of Mr. B. G. Hathaway as their Eastern Representative. Located at 6016 Morton St., Philadelphia, Pa., he will cover Massachusetts, Delaware, Connecticut, Rhode Island, Metropolitan New York, Eastern Pennsylvania, New Jersey and Maryland.

Other representatives throughout the United States are:

Mr. D. S. Hupp, 1427 S. Hope St., Los Angeles, Calif., covers the Pacific Coast, including Washington, Oregon and California.

Mr. A. A. Ways, 5306 Vanderbilt, Dallas, Tex., covers Texas, Oklahoma, Louisiana and Arkansas.

Mr. E. V. Dunbar, 2544 Peachtree St., Atlanta, Ga., covers the Southeastern Territory, south of the Mason-Dixon line, east of the Mississippi River.

View of the Stockroom of the Harry Alter St. Louis branch

Mr. E. A. Russell, 7 E. 19th St., Kansas City, Mo., covers Kansas, Nebraska, North and South Dakota, Missouri, Iowa and Minnesota.

Mr. S. I. Slomo, 2618 Michigan, Chicago, Ill., covers Indiana, Ohio, Kentucky and the southern part of Michigan.

J. F. COYNE WITH CHANNON CO.

H. CHANNON CO., 133 N. Wacker Drive, Chicago, announces the association of Mr. J. F. Coyne with the Refrigeration, Air Conditioning and Heating Division of their company.

Mr. Coyne has considerable knowledge and experience in the field, which will be available to their friends in the industry.

IN MISSOURI VALLEY CHAPTER —IT'S "MADAM SECRETARY"

IN the formation of Missouri Valley Chapter, R.S.E.S., an active participant in the starting of this young and aggressive organization was Mrs. P. O. Jones, who at the regular election of officers was elected secretary of the chapter.

Mrs. Jones—or "Pat," as she is familiarly known to a host of the service engineers in Omaha and vicinity—has the distinction at

MRS. P. O. JONES

the present time of being the only member of the National Society of the opposite sex.

Mrs. Jones, as an associate member, has an active interest in the refrigeration business. As manager of the United Supply Company at 207 N. 16th St., Omaha, she conducts a successful wholesale refrigeration parts jobbing business, and they say that "Pat" is well qualified to do most any job required in the refrigeration field. Your Editor has no record of whether she has done actual servicing work, but it is our guess that she knows what the various component parts of refrigeration systems are supposed to do.

VIEW OF UNITED SUPPLY CO. STORE

In her job as manager, she buys all of the products that are handled in the complete line of refrigeration products, and she is just as well qualified to sell these same products—and does.

She pursues an active day and is found on the job early in the morning putting in a full day, and maintains day and night service. Pat has no objection to accommodating a customer out of office hours in getting parts if it will help him out on an urgent job.

With all of her business activities, she is just as anxious in serving her chapter as efficiently as any secretary in the national organization.

NEW CATALOGS AND BULLETINS

KRAMER COIL—Bulletins No. 1137 and No. 1037, covering Unicon Condensers and the Kramer Water Cooling Evaporator. Write Trenton Auto Radiator Works, Trenton, N. J.

GENERAL CONTROLS—Catalog on Damper Controls, Pilots, Thermostats, Transformers, Strainers, Switches-Manual, Valves-Solenoid Operated, Package Sets. Write General Controls, New York, Chicago, Cleveland, San Francisco.

HARRY ALTER CO.—Catalog No. 121, covering all refrigeration parts and supplies, 113 pages. Write The Harry Alter Co., 1728 S. Michigan Ave., Chicago, Ill.

REFRIGERATION SERVICE ENGINEERS' SOCIETY

Official Announcements of the activities of the National Society and Local Chapters appear in this department as well as articles pertaining to the educational work of the Society.

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DAYTON CHAPTER NO. I, DAYTON, OHIO: Meets every other Wednesday. President, E. O. Bowman; Secretary, Geo. O. Snyder, R.R. 5, Box 224, Dayton, Ohio.

INDIANAPOLIS CHAPTER NO. I, INDIANAPOLIS, IND.: Meets on the 2nd and 4th Tuesdays of the month on the 14th floor of the Lincoln Hotel. President, J. O. Cummings; Secretary, J. A. Salter, 3607 E. Michigan St., Indianapolis, Ind.

KANSAS CITY CHAPTER NO. I, KANSAS CITY, MO.: Meets on 2nd and 4th Tuesdays of month at Commonwealth Hotel. President, T. L. Anderson; Secretary, S. A. Leitner, 3112 Holmes St., Kansas City, Mo.

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ONTARIO MAPLE LEAF CHAPTER NO. I, TORONTO, ONT., CANADA: Meets 2nd and 4th Fridays at Carls-Rite Hotel. President, A. E. Doan; Secretary, H. F. Nye, 80 Ontario St., Toronto, Ont., Canada.

PITTSBURGH CHAPTER NO. I, PITTSBURGH, PA.: Meets 2nd Friday of month at Commonwealth Building. President, E. V. Black; Secretary, F. V. Golitz, 1109 Pemberton St., Pittsburgh, Pa.

ROCKFORD CHAPTER NO. I, ROCKFORD, ILL.: Meets 1st and 3rd Mondays of month at the Nelson Hotel. President, R. C. McCarthy; Secretary, W. W. Larson, 1120 Tenth Ave., Rockford, Ill.

ST. JOSEPH CHAPTER NO. I, ST. JOSEPH, MO.: President, E. J. Storm; Secretary, H. E. Young, 305 S. 6th St., St. Joseph, Mo.

ST. LOUIS CHAPTER NO. I, ST. LOUIS, MO.: Meets 2nd and 4th Thursdays at German House, 2345 Lafayette St. President, L. L. Vollman; Secretary, E. A. Plesskott, 2145 67th St., St. Louis, Mo.

GREATER TOLEDO CHAPTER NO. I, TOLEDO, OHIO: Meets 3rd Wednesday of month at Toledo Edison Service Bldg. President, A. J. King; Secretary, H. C. Benington, 139 N. Erie St., Toledo, Ohio.

TRI-COUNTY CHAPTER NO. I, ILLINOIS: Meets 2nd Monday of month in Elgin, Aurora and Joliet, Illinois, respectively. President, Eugene White; Secretary, Willis Stafford, 726 Hinman St., Aurora, Ill.

TRI-STATE CHAPTER NO. I, HUNTINGTON, W. VA.: Meets 1st Monday of month from May to October, and from October to May on the 1st and 3rd Mondays. President, C. A. Brunton; Secretary, A. W. Albertsen, 206 W. 8th Ave., Huntington, W. Va.

TWIN CITIES CHAPTER NO. I, MINNEAPOLIS AND ST. PAUL, MINN.: Meets 2nd Tuesday of month at the Midway Y. M. C. A. at 1977 University Ave., St. Paul. President, A. E. Johansen; Secretary, B. J. DeLange, Como Station, Route 3, St. Paul, Minn.

WICHITA CHAPTER NO. I, WICHITA, KANSAS: (Now forming.)

YOUNGSTOWN CHAPTER NO. I, YOUNGSTOWN, OHIO: Meets the 1st and 3rd Monday of month at the Central Y. M. C. A. President, M. Bokesch, Sr.; Secretary, Martin Bokesch, Jr., 2328 Mahoning Ave., Youngstown, Ohio.

ON TO BUFFALO!

Fifth Annual Convention and Manufacturers' Exhibit

R.S.E.S. CONVENTION • NOV. 2-3-4, 1938

As this issue goes to press, the Board of Directors of the Society announce the selection of Buffalo for the 1938 Convention, November 2, 3 and 4, 1938

TO THE MEMBERS

FELLOW Members of the R.S.E.S.: For one who has been privileged to have had a part in the inception, from its first convention, of the great organization which we know now as the Refrigeration Service Engineers Society, it is no easy matter to express adequately the deep sense of appreciation and of responsibility which my election at the last annual convention to the honored office of the Presidency imposes.

Giving due credit to those whose efforts produced the early refrigeration equipment, I am sure we can realize the wide extent of the service which you have achieved.

Little, indeed, of today's splendid achievement was envisioned by the pioneers who began the early development of refrigeration. At the time when our main source of refrigeration, other than nature, was the bulky steam-driven ice plant, it required more than a prophet to foresee just what refrigeration engineering was destined to become. Starting with the Thermal Laws as presented by Lord Kelvin, the speed with which our first primitive methods and equipment were scrapped and superseded by those of greater refinement, larger power, etc., was surely in full keeping with the most advanced practices which the older sciences of engineering were even then establishing.

Competition among the few in the field during the first few years after the World War was fully as intense and exacting as at the present. International pride from the very beginning kept us spurred on to further advances.

Refrigeration of the future can be guessed at only with extreme caution, but we know it will be forever indispensable to the advancement of the civilization we are privileged to enjoy today.

In all seriousness it behooves us of the refrigeration installation and servicing profession to concentrate every human effort upon the urgent and important task of rendering an ethical, conscientious service. "He profits most who serves best."

Mythology tells us of a sleeping giant—the Cyclops—having one eye centered in his forehead. Today that giant is yet an infant—Air Conditioning. But already he is stirring, growing, and making plans for another outstanding industrial development.

It behooves us to watch closely this wonder, to guide by careful thought, by standardization of installations, to the end that in the briefest possible time we may have, in as equally perfected form, and available for every home, the comforts to be made possible by air conditioning.

Fellow members of the Refrigeration Service Engineers Society, as one of your officers who has followed through the swift years the still swifter growth of this splendid science, I take justifiable pride in all your amazing achievements.

Conscious of our past triumphs over nature (physical and human), frankly acknowledging the shortcomings still to be made good, let us not pause a moment in our onward stride, but again highly resolve that what refrigeration has thus far accomplished in the cause of higher civilization is but a brave beginning—the blazing of a trail—a forecast of yet greater things which lie before us for the welfare of mankind.

W. HALL MOSS,
National President, R.S.E.S.

KANSAS CITY CHAPTER

Meeting of January 11, 1938

By **S. A. LEITNER,** *Secretary*
3112 Holmes St., Kansas City, Mo.

THIS being the first meeting in January, election of officers was held. Mr. T. L. Anderson was elected *President;* J. P. DeWilde, *1st Vice-President;* H. F. Andrews, *2nd Vice-President;* W. C. Von Demfange, *Treasurer;* S. A. Leitner, *Secretary;* A. Fromholtz, *Sergeant-at-arms; Board of Directors:* L. H. Roberts, F. A. Thompson, H. L. Green.

Mr. Roy Cox suggested that plans be formulated to have the annual banquet in the near future.

A standing vote of thanks and appreciation was given to the retiring president, Mr. H. L. Green, and his officers for their efforts in 1937.

PERFECTION

IS THE SAME · · ·
ON BOTH HEMISPHERES

V-METH-L

is the choice of service men and refrigeration engineers throughout the world.

Perfection in methyl chloride is proven by performance. Thus the economical and dependable operation of V-METH-L is the best testimony of the skill and care that go into its production.

V-METH-L is non-corrosive to copper and iron, permitting the economical use of copper-flanged tubing. Its uniform quality insures dependability. Freedom from moisture and acidity and a pleasant odor add to its superiority. V-METH-L maintains sub-zero temperatures at above atmospheric pressures—an important safety feature. No wonder men who know refrigeration choose V-METH-L.

V-METH-L and its twin refrigerant, EXTRA DRY ESOTOO, are available promptly throughout the world.

VIRGINIA SMELTING CO.
WEST NORFOLK, VIRGINIA

New Chapters in Los Angeles and London, Ontario Organized

LONDON, ONTARIO, CHAPTER

A CHAPTER of the Refrigeration Service Engineers Society was organized for Western Ontario on January 21, at a gathering of refrigeration men in Moose Hall, London, Ontario.

With about 35 in attendance at this meeting, temporary officers were elected and the plans laid for a new chapter. Nineteen names were affixed to the application for a charter, with a probable ten more to be added before the application is made. The chapter has a goal of 75 members.

Mr. Gordon A. Burns, national second vice-president and treasurer of the Maple Leaf Chapter, outlined the purposes and objects of the Society, and assisted in the laying of the groundwork for the chapter. Mr. A. E. Doan, president of the Maple Leaf Chapter, spoke on the advantages of membership in the R.S.E.S.

The plans for the meeting were carried out through the efforts of Mr. Charles Cunningham, service manager of the London Kelvinator plant. Temporary officers elected were: Wm. Bevis, *President;* R. E. Campbell, *Secretary;* R. A. Wright, *Treasurer;* E. Aldborough, *Chairman, Educational Committee.*

S S S

LOS ANGELES, CALIFORNIA, APPLIES FOR CHARTER

FOLLOWING several months of intensive work by an interested group of service men, Los Angeles Chapter is now the newest local organization to receive its charter.

Following the holding of several important meetings to discuss the purposes and objects of the National Organization the chapter formally applied for a charter, which will be received at an early meeting.

Thirty-five have signed the petition for charter and have adopted a constitution and by-laws in conformity with that of the national association. The officers elected for the chapter include the following: W. W. Allison, *President;* John Lewis, *Secretary;* J. C. Rodgers, *Treasurer.*

Los Angeles Chapter is the second Pacific Coast chapter of the National Society, the other being established at Long Beach. Charter members of the new chapter include:

J. V. Allen
W. W. Allison
P. H. Askew
J. C. Blair
C. W. Bush
W. R. Capps
H. E. Fatzinger
E. K. Fosbender
F. W. Gillett
E. L. Glaser
E. F. Hein
K. Van Hender ider
A. L. Lafferty
T. E. Lawler
John Lewis
A. O. Ludtke
F. M. Magnuson
T. A. Matthews
G. R. McLay
W. A. Myers
P. Nadeau
W. L. Nadeau
J. R. Payne
M. J. Pitts
J. C. Rodgers
M. Rohan
L. P. Roth
R. P. Rowton
J. E. Salisbury
M. F. Stutzman
Floyd Tanner
J. H. Underwood
J. B. Wade
C. D. Weierman
W. E. Young

S S S

DAYTON CHAPTER

Meeting of December 22, 1937

By G. O. SNYDER, *Secretary*
R.R. 5, Box 224, Dayton, Ohio

PRESIDENT E. O. BOWMAN called the meeting to order at 8:30 P. M., followed by the reading of minutes of the previous meeting, roll call and reports of various committees.

A Code and License Committee was appointed, consisting of Messrs. H. F. Pottenger, John Becker and T. C. Bickel.

Mr. J. E. Dannels, representing the Fedders Mfg. Co. of Buffalo gave a very interesting talk and demonstration with picture slides, as to the construction, dry process and inspection of their products.

Meeting of January 5, 1938

The meeting was called to order by 2nd Vice-President John Becker at 8:30 P. M.

Discussion followed the reading of the previous meeting's minutes and roll call, on plans and dates for various representatives for future meetings.

On February 2nd a representative of the Mueller Brass Co. is to visit the chapter.

Meeting of January 19, 1938

As Mr. C. P. Eich, National Director, had come from Youngstown to this meeting for the purpose of presenting the charter to Dayton Chapter, just as soon as the roll call and regular business had been dispensed with, the meeting was turned over to Mr. Eich.

The charter was presented to the chapter, as well as the membership cards and certificates to the individual members, and then Mr. Eich gave a very interesting and lengthy

(Continued on Page 46)

TIME TESTED AND IMPROVED!

DEHYDRATORS

These new TIME-TESTED Dehydrators have these outstanding advantages:

1. Cone-shaped screen—providing greatly increased separating area. Shape of screen causes particles to settle at base of cone, permitting free passage of refrigerant through center.
2. Pure wool packing inside cone screen—a further protection which traps dust-like particles which may penetrate screen.
3. Improved felt pad between interior cone screen and exterior flat screen.

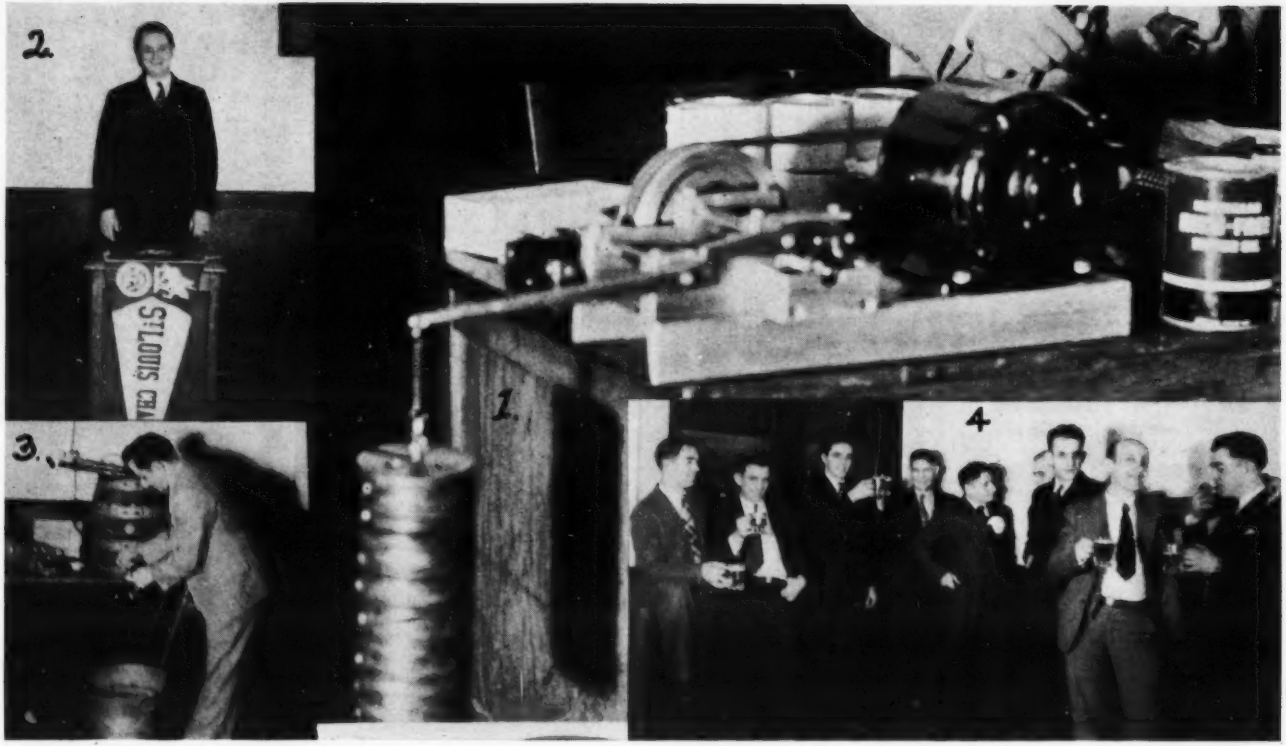
Most dehydrating agents used in refrigerating systems are continually being sub-divided into smaller or dust-like particles. This may happen through the taking up of moisture, or by abrasion, etc. These particles restrict the capacity of, and sometimes completely clog the disc screens and filters with which the old, or conventional, type dehydrator is equipped, resulting in pressure drop and eventual trouble at the expansion valves.

All Mueller Brass Co. Dehydrators are now provided with cone-shaped screens. This new feature, together with other improvements, provides maximum drying efficiency with minimum pressure drop. There is a right style for every purpose. Write for descriptive literature.

Stocked by leading jobbers everywhere.

MUELLER BRASS CO.
PORT HURON, MICHIGAN
STREAMLINE
TRADE MARK REG. U. S. PAT OFFICE

MORE EFFICIENT · LESS RESTRICTION · GREATLY INCREASED SCREEN AREA ·



ST. LOUIS CHAPTER ACTIVITIES.—1. Oil film testing equipment used in demonstration at meeting. 2. President L. L. Vollman. 3. Plesskott in the role of Bartender. 4. The boys who kept him busy.

Want *Information*?

Use The R. S. E. SERVICE DEPARTMENT

—It's for Your Convenience

THIS department is conducted for the convenience of our subscribers. We will ask the manufacturers and distributors to send you the latest information on the items checked.

- ☐ Belts
- ☐ Blow Torches
- Blowers (see Unit Blowers)
- ☐ Books
- ☐ Brushes, Motor
- ☐ Bushings, Motor
- ☐ Carbon Tetrachloride
- ☐ Charging Hose
- ☐ Charging Stand

- Coils
  - ☐ Fin
  - ☐ Pipe
- ☐ Compressors
- Condensers
  - ☐ Air Cooled
  - ☐ Water Cooled
- ☐ Condenser Water Regulators
- ☐ Connecting Rods
- Controls
  - ☐ Cold
  - ☐ Humidity
  - ☐ Liquid Level
  - ☐ Pressure
  - ☐ Temperature
  - ☐ Thermostatic
  - ☐ Water
- ☐ Domestic Evaporators
- Dehydrants
  - ☐ Activated Alumina
  - ☐ Calcium Chloride
- ☐ Dehydrators
- Door Seals (see Gaskets)
- ☐ Drums, Service
- ☐ Dryers

- Evaporators
  - ☐ Dry
  - ☐ Flooded
- ☐ Fan and Pulley Assemblies
- Filters (see Strainers)
- ☐ Float, High Side
- ☐ Float Valve Seats
- Fittings
  - ☐ Flared
  - ☐ Streamline
- Gaskets
  - ☐ Compressor
  - ☐ Door
- ☐ Gasket Material
- ☐ Gasket Tackers
- ☐ Goggles
- ☐ Gauges, Service
- ☐ Hardware, Refrigerator
- ☐ Leak Detectors
- ☐ Lapping Compound and Materials
- ☐ Liquid Indicator
- ☐ Lubricating Oils
- ☐ Low Side Float Switches
- ☐ Low water
- ☐ Motors
- ☐ Needles, Float Valve
- ☐ Oil Return
- Packing
  - ☐ Fabric
  - ☐ Metallic
- ☐ Piston Pins
- ☐ Piston Rings
- ☐ Porcelain Refrigerator Cement
- ☐ Pumps, Circulating
- ☐ Receivers
- Recording Instruments
  - ☐ Humidity
  - ☐ Running Time
  - ☐ Temperature
- Refrigerants
  - ☐ Sulphur Dioxide
  - ☐ Methyl Chloride
  - ☐ Carrene
  - ☐ Freon
  - ☐ Iso Butane
  - ☐ Ethyl Chloride
- Refrigerator Dishes
  - ☐ Glass
  - ☐ Porcelain
- ☐ Safety Masks

- ☐ Seals, Shaft
- ☐ Resurfacing Stones
- Strainers
  - ☐ Expansion and Float Valve
  - ☐ Liquid Line
  - ☐ Suction Line
- Switches
  - ☐ Air Temperature
  - ☐ High Pressure Control
  - ☐ Low Pressure Control
  - ☐ Pressure
  - ☐ Temperature
- ☐ Mercury
- Thermostats
  - ☐ Air Temperature (Cooling)
  - ☐ Air Temperature (Heating)
  - ☐ Brine
  - ☐ Domestic Refrigeration
  - ☐ Industrial Refrigeration
- Thermometers
  - ☐ Refrigerator
  - ☐ Test
- ☐ Tool Chests
- Tools
  - ☐ Flaring
  - ☐ Pinchoff
  - ☐ Tube Bender
  - ☐ Tube Cutter
  - ☐ Wrench Sets
- ☐ Trap, Seals
- ☐ Trays, Ice Cube
- Tubing
  - ☐ Copper
  - ☐ Finned
  - ☐ Steel
  - ☐ Tinned
- ☐ Unit Blowers
- Valves
  - ☐ Automatic Expansion
  - ☐ By Pass
  - ☐ Check
  - ☐ Compressor
  - ☐ Expansion
  - ☐ Flapper
  - ☐ Magnetic
  - ☐ Pressure Reducing
  - ☐ Shutoff
  - ☐ Solenoid
  - ☐ Thermostatic Expansion
  - ☐ Two-Temperature
  - ☐ Water
- ☐ Valve Retainers
- ☐ Valve Stems

Write in Names of Products Not Listed

Name .....

Address .....

City and State .....

Business .....

Mail This Page to the

Refrigeration Service Engineer 433 N. Waller Ave., Chicago, Ill.

1. Oil him testing equipment used in demonstration at meeting. 2. President L. L. Vollman. 3. Pleskott in the role of Bartender. 4. The boys who kept him busy.

DAYTON CHAPTER

(Continued from page 42)

talk on the foundation and growth of the R.S.E.S. organization.

Mr. Eich's visit, as well as his most welcome talk, was greatly enjoyed by all present, including the eight visitors present, who are prospective members of the chapter. One new application was accepted.

A sociable time was enjoyed by all while refreshments were served.

S S S

Wm. N. E. Harris
Massachusetts

As this is the first time in four years I have had occasion to write to you, may I pay tribute to your publication. It has never stood still, and gets better each month, returning larger "dividends" all the time.

S S S

AKRON CHAPTER

Meeting of January 18, 1938

By **CHARLES HALL,** *Secretary*
938 Haynes St., Akron, Ohio

AT the meeting held on January 18th, election of officers for the current year took place, and resulted with Mr. Charles Hall as the new president, and Mr. P. G. Hansen as secretary. Mr. C. L. Wall has been re-elected treasurer. Mr. C. L. Wall was appointed as chairman of the Educational Committee.

The ladies were also present at this meeting and talked over plans for the activities of the auxiliary. Mrs. P. G. Hansen was elected as the first Chairlady of the Akron group.

Three new applications were received at the meeting, and a discussion took place regarding the next meeting of the Ohio State Association to be held in Canton very soon.

S S S

AKRON LADIES

By **MRS. P. G. HANSEN,** *Chairlady*
973 Mercer Ave., Akron, Ohio

BELIEVE it or not, but here is one Winchell missed. The Akron Chapter of the R.S.E.S. has a new baby. A Ladies' Auxiliary came into being in October, 1937, and like all babies we are doing very nicely.

We have been meeting with the men once each month in the homes of the various members.

No plans have as yet been very definitely made, due to our tender age, but you'll be sure to hear from us again real soon.

"Chieftain" Quality Built Compressors and Condensing Units

are designed to give you many years of quiet, efficient and trouble free service by Engineers who have been serving the refrigeration industry for the last fourteen years.

They have again "scored a hit" with a new "V" type four cylinder compressor which is designed for use with ½ to 1 HP motors. All of the advanced features that have proven so successful in "Chieftain" household and light commercial units are now incorporated in this new four cylinder model.

Mechanical improvements include, force feed lubrication to piston pin and connecting rod bearings, positive alignment of cylinder bores with main bearings by casting cylinders and crankcase in one piece. Adjustable suction shut-off valve, interchangeable parts with single and twin cylinder models. All compressor parts are machined to precision limits on up to date equipment and assembled in glass enclosed rooms where only filtered, dust free air is admitted.

Write for our latest descriptive catalog

TECUMSEH PRODUCTS CO., Refrigeration Division TECUMSEH, MICH.

THE "CONTRIBS COLYUM"

By THE KINGFISH

WE write these lines to the accompaniment of a 50 mile gale with the outside temperature at 7 degrees above zero, snow flurries galore are whirling around but do not get a chance to light any place—we have, however, oiled the snow-shovel in case it should become necessary to get it into action.

Floyd Duval from Mills Novelty Co. pays us a visit and is full of enthusiasm for his job as a Mills representative.

Advertisement: Good democratic territory—St. Louis Chapter. It seems that, if nominated, one is sure of being elected to office.

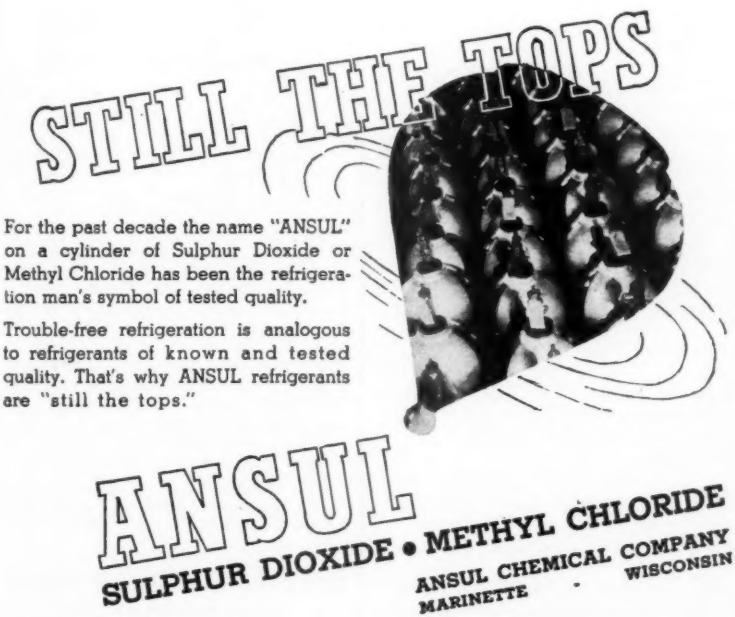
In looking over the pictures of the Chicago Chapter Initiation team we recognize Joe Corso as the chaplain, Fred Roth as "Isaack Cohen," Harry Logeman and Michael Halter as the "Cops," Ralph Vanston as the "King," Joseph Holub as a clown.

Indianapolis Chapter and Mississippi Valley Chapter have big banquets and a wonderful time, according to all reports, but they picked bad nights. We had an invitation for the parties but as the roads were one glare of ice we decided that a hundred mile trip would take up all day—and so we missed a lot of fun.

Flash: The new President of St. Louis Chapter, Vollman, has decided that he will win the first prize in the Irish Free-State Hospital Sweepstakes and that he, before going on a world cruise, is going to pay the 1938 dues in full for all present and past members of his chapter. Well, anyway, it was a pleasant dream.

We hear that Claude Brunton has bought a new home, and this time up on a hill. He says he will not again be caught living in the bathroom the way he had to last year when the city of Huntington was under water during the great flood, and he had eight feet of water in his living quarters.

Are you reading Fedders News? For the


STILL THE TOPS
For the past decade the name "ANSUL" on a cylinder of Sulphur Dioxide or Methyl Chloride has been the refrigeration man's symbol of tested quality.
Trouble-free refrigeration is analogous to refrigerants of known and tested quality. That's why ANSUL refrigerants are "still the tops."
ANSUL
SULPHUR DIOXIDE • METHYL CHLORIDE
ANSUL CHEMICAL COMPANY
MARINETTE WISCONSIN

last three months there have been some very fine articles by Chief Engineer Joe Askin covering the subject of "The Cold Weather Problem in Commercial Refrigeration," and now we see comments by a number of readers. This is a subject which can create as much discussion as the old question of "What produces copper coating of the parts in the compressor of a Methyl Chloride system"?

We should like to see an article in this magazine covering the subject of cold storage lockers—for low temperature—how a complete job should be connected and some figures as to the smallest plant which may be operated profitably. What do you think?

Our better half is beginning to wonder whether we are going to have a convention in 1938. She says that this is the first year we have had to wait so long for the important news. How about it, Mr. Moss?

Here's our best wishes for success to Geo. Clark in his new position as chief engineer of the Detroit Lubricator Co. We have every reason to be proud of our Educational Committee which is headed by Geo. Clark and sincerely hope that he will continue this great work.

We wonder whether Bill Drake and Robinson of Indianapolis find it easier to teach refrigeration to beginners than to convince the ladies that they are really service men and not hold-up men trying to get into the apartment to rob them of their valuables.

That "Genuine Detroit" Service Chart is a "honey." It is the first time we have seen so much information packed into such a small space and it should be a great help to all of us.

Mr. and Mrs. Arnold Schroeder, of Chicago, Ill., recently returned from an enjoyable two weeks' vacation in Florida.

We hear that the Central Indiana Chapter has developed a "tall tale club" in which Paul Jacobsen and Herbert Hale seem to hold the honors.

Ed. Dick, of the Mississippi Valley Chapter, stamps his name on all parts installed by him with an iron stamp.

A new form of "doodling" was recently started by Harvey Burgess, of Tri-County

New

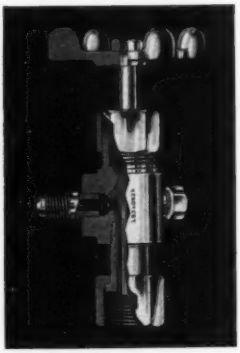
KEROTEST

PURGE VALVE

HAS GAUGE CONNECTION

INDEPENDENT

OF SERVICE CONNECTION



In the handling of high pressure refrigerants, common sense and safety demands a valve especially built for the purpose—one that not only provides quick, positive transfer control but also one that is designed to give maximum protection to the service man.

For this purpose, the new Kerotest Purge and Charging Valves have a special gauge connection *independent* of the service connection. This Kerotest feature enables the service man to keep a constant check on the pressure inside the unit throughout the charging or purging operation, WITHOUT BREAKING ANY CONNECTIONS. It eliminates the inconvenience of removing the purge valve and attaching the gauge . . . greatly simplifies and speeds the operation yet provides an important safety factor.

For the sake of efficiency, safety and convenience, ask your local Kerotest Jobber about them.

KEROTEST MANUFACTURING CO.

PITTSBURGH, PA.

FOR QUICK SERVICE

KEROTEST

REGISTERED U. S. PAT. OFF.

FORGED BRASS PRODUCTS

Phone your nearest distributor

JOBBERS WITH LOCAL STOCKS

Albany, N. Y. ..... Hoy & Co.
Allentown, Pa. .. General Refrigeration Supply Co.
Atlanta, Ga. .. J. M. Tull Metal & Supply Co., Inc.
Atlanta, Ga. ..... M. D. Patterson
Baltimore, Md. ..... Clenden'n Bros., Inc.
Baltimore, Md. .. Melchior, Armstrong, Dessau Co.
Binghamton, N. Y. .... Syracuse Equipment Corp.
Boston, Mass. ..... A. E. Borden Co.
Bridgeport, Conn. ..... Parsons Bros.
Brooklyn, N. Y. .....
..... Coleman Electrical Supply Co., Inc.
Brooklyn, N.Y. .. Melchior, Armstrong, Dessau Co.
Brooklyn, N. Y. ..... The Capson Co.
Buffalo, N. Y. ..... Root, Neal & Co.
Cambridge, Mass. .....
..... Melchior, Armstrong, Dessau Co.
Charlotte, N. C. ..... Henry V. Dick Co.
Chattanooga, Tenn. ..... Noland Co., Inc.
Chicago, Ill. ..... H. W. Blythe Co.
Chicago, Ill. ..... Borg-Warner Service Parts Co.
Chicago, Ill. ..... Fred C. Kramer Co.
Chicago, Ill. ..... H. Channon Co.
Chicago, Ill. .....
..... Automatic Heating & Cooling Supply Co.
Chicago, Ill. ..... The Harry Alter Co., Inc.
Cincinnati, Ohio ..... The Merkel Bros. Co.
Cincinnati, Ohio ..... Williams & Co., Inc.
Cleveland, Ohio ..... The Harry Alter Co., Inc.
Cleveland, Ohio ..... Williams & Co., Inc.
Columbus, Ohio ..... The Justus & Parker Co.
Dallas, Texas ..... The Electromotive Co.
Davenport, Iowa ..... Republic Electric Co.
Dayton, Ohio ..... The W. H. Kiefaber Co.
Denver, Colo. ..... Auto Equipment Co.
Detroit, Mich. ..... J. M. Oberc, Inc.
Detroit, Mich. ..... Borg-Warner Service Parts Co.
Flint, Mich. ..... Shand Radio Specialties
Fort Wayne, Ind. ..... H. J. Schroeder Co.
Ft. Worth, Tex. .....
..... McKinley Refrigeration Supply Co.
Greensboro, N. C. ..... Hasco, Inc.
Harrisburg, Pa. .....
..... Melchior, Armstrong, Dessau Co.
Hartford, Conn. .....
..... Melchior, Armstrong, Dessau Co.
Hartford, Conn. ..... Marsden & Wasserman, Inc.
Hempstead, Long Island, N. Y. .. Sid Harvey, Inc.
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Houston, Tex. .... Walter Refrigeration Supply Co.
Indianapolis, Ind. ..... F. H. Langsenkamp Co.
Jackson, Miss. ..... Enochs Sales Co.
Jacksonville, Fla. ..... Jamita Company
Kansas City, Mo. .....
..... Forslund Pump & Machinery Co.
Knoxville, Tenn. ..... Leinart Engineering Co.
London, Ont., Canada .....
..... Refrigeration Supplies Co., Ltd.
Long Beach, Calif. ..... L. B. Marsh
Los Angeles, Calif. .... Refrigeration Service, Inc.
Los Angeles, Calif. . Refrigeration Parts Exchange
Louisville, Ky. .... Louisville Mill Supply Co., Inc.
Lubbock, Tex. . R. & R. Parts & Supply Co., Inc.
Macon, Ga. ..... Lowe Electric Co.
Madison, Wis. ..... Gustave A. Larson Co.
Memphis, Tenn. .. United Refrigerator Supply Co.
Miami, Fla. ..... Bailey-Milam, Inc.
Milwaukee, Wis. . Chase Brass & Copper Co., Inc.
Milwaukee, Wis. ..... Refrigeration Specialty Co.
Minneapolis, Minn. .....
.. Refrigeration & Industrial Supply Co., Inc.
Montreal, Quebec, Canada .....
..... Railway & Engineering Specialties, Ltd.
Mt. Vernon, N. Y. .....
..... County Seat Plumbing Supply Co.
Newark, N. J. ..... T. W. Binder Co.
New Orleans, La. ..... Enochs Sales Co.
New Orleans, La. ..... The Spangler Co.
New York, N. Y. ..... Aetna Supply Co.
New York, N. Y. .....
..... Melchior, Armstrong, Dessau Co., Inc.
New York, N.Y. . Paramount Electrical Supply Co.
New York, N. Y. ..... The Harry Alter Co., Inc.
Norfolk, Va. ..... Noland Co., Inc.
Oakland, Calif. ..... Pacific Tool & Supply Co.
Oklahoma City, Okla. ..... Mideke Supply Co.
Omaha, Nebraska ..... United Supply Co.
Paterson, N. J. ..... White & Shauger, Inc.
Peoria, Ill. ..... Wilkins Pipe & Supply Co.
Pittsburgh, Pa. ..... Williams & Co., Inc.
Philadelphia, Pa. .....
..... Melchior, Armstrong, Dessau Co., Inc.
Philadelphia, Pa. ..... Victor Sales Corporation
Phoenix, Ariz. . Refrigeration Supplies Distributor
Portland, Ore. .... Bill Hieber, 526 S. E. Wash.
Providence, R. I. .....
..... Rhode Island Supply & Eng. Co.
Rochester, N. Y. .... Ontario Metal Supply, Inc.
Rochester, N. Y. .....
..... Melchior, Armstrong, Dessau Co., Inc.
Rockford, Ill. ..... Gustave A. Larson Co.
Sacramento, Calif. ..... Hinshaw Supply Co.
Scranton, Pa. .... Central Service Supply Co.
St. Joseph, Mo. ..... Bristol Supply Co.
St. Louis, Mo. ..... The Harry Alter Co., Inc.
St. Louis, Mo. ..... The Spangler Co.
Salt Lake City, Utah ..... Peerless Utah Co.
San Antonio, Texas ..... Straus-Frank Co.
San Francisco, Calif. . California Refrigerator Co.
San Juan, Puerto Rico. . Refrigeration Supply Co.
Seattle, Wash. ..... Refrigerative Supply, Inc.
Sioux City, Iowa . National Refrigeration Service
South Bend, Ind. .... The South Bend Supply Co.
South Bend, Ind. ..... F. H. Langsenkamp Co.
Springfield, Ill. ..... United States Electric Co.
Springfield, Mass. ..... C. P. Payson Co.
Syracuse, N. Y. .... Syracuse Equipment Corporation
Toledo, Ohio . The Heat & Power Engineering Co.
Toronto, Ontario, Canada .....
..... Railway & Engineering Specialties, Ltd.
Tulsa, Okla. ..... Machine Tool & Supply Co.
Vancouver, B. C., Canada ..... Fleck Bros., Ltd.
Washington, D. C. ..... Refrigeration Supply Co.
Waterloo, Iowa ..... Winterbottom Supply Co.
White Plains, N. Y. .....
..... County Seat Plumbing Supply Co., Inc.
Wilkes Barre, Pa. ..... Radio Service Co.
Winnipeg, Manitoba, Canada .....
..... Railway & Engineering Specialties, Ltd.
Worcester, Mass. ..... Standard Supply Co.

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Chicago, Ill. — Dayton, Ohio — Los Angeles, Calif. — St. Louis, Mo.
Dallas, Texas — Detroit, Mich. — New York, N. Y. — San Francisco, Calif.

GENERAL EXPORT REPRESENTATIVES

Melchior, Armstrong, Dessau Co., Inc.
300 Fourth Ave., New York City, N. Y., U.S.A.

Chapter—tearing ten dollar bills into little pieces. We understand this fad, which we are afraid might spread, was an unconscious invention of Harvey's during a recent meeting.

If you want to win favor with June Brunton, Huntington, W. Va., send her your coupons from your "Kool" cigarettes. We understand she is making a collection.

As we wind up this column, a rumor filters through to us that one of our former National Officers has just been elected to the position of Deacon in his church. We have not had time to verify this statement yet and so take no responsibility for it.

S S S

TWIN CITIES CHAPTER

Meeting of January 11, 1938

By B. J. DE LANGE, *Secretary*
Como Station, Route 3, St. Paul, Minn.

AFTER the regular business of the chapter had been taken care of and various communications read, nominations from the floor for the election of officers were called for, with the following being elected for the various offices: A. G. Larson, *President;* Wm. V. Warner, *1st Vice-President;* W. E. Gleb, *2nd Vice-President;* B. J. DeLange, *Secretary;* A. M. Palen, *Treasurer;* Otto Kroberg, *Sergeant-at-arms;* and C. A. McCafferty, *Educational Chairman.*

It was unanimously agreed that meeting notices are to be sent to the members and all others on the mailing list not later than Thursday prior to the Tuesday on which meetings are to be held.

Two visitors were present: Mr. Otto Chermak and Mr. Gene Coulter of Minneapolis.

S S S

TOLEDO CHAPTER

Meeting of January 19, 1938

By H. C. BENINGTON, *Secretary*
139 N. Erie St., Toledo, Ohio

THE meeting was held at Redman's Hall, 3368 Monroe St., with President A. J. King presiding.

Mr. C. O. McCauley, member of the National Board of Directors, of Pittsburgh,

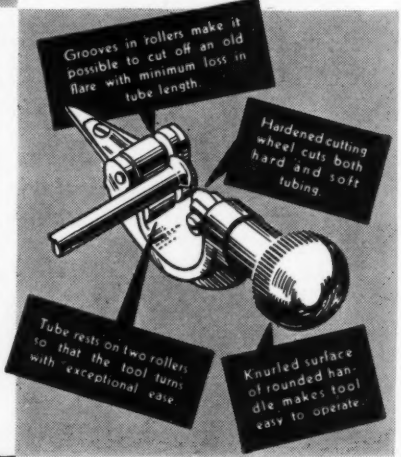
For better tube cutting—

IMPERIAL TUBE CUTTERS

WITH Imperial tube cutters you can make a quick, clean, right angle cut, leaving no burrs or chips to clog the line and without flattening the tube.

The No. 174-F has a number of special features as shown in the adjoining illustration. It will handle tubing from 3/16" to 3/4" O.D. In addition Imperial has other types of cutters including the No. 204-F which will handle tubing up to 2 1/4" O.D.

THE IMPERIAL BRASS MFG. CO.
1204 W. Harrison St., Chicago
ORDER FROM YOUR JOBBER


Grooves in rollers make it possible to cut off an old flare with minimum loss in tube length.
Hardened cutting wheel cuts both hard and soft tubing.
Tube rests on two rollers so that the tool turns with exceptional ease.
Knurled surface of rounded handle makes tool easy to operate.

IMPERIAL COPPER TUBING *Service Tools*

CUTTING ● FLARING ● BENDING ● COILING ● PINCH-OFF ● SWEDGING

presented the charter to the chapter and also gave a short talk on membership attendance of various chapters.

A motion was made and seconded that permanent officers be elected at the next meeting to be held at Redman's Hall on February 16th.

OMAHA HOLDS MEETINGS EVERY WEEK

THE Omaha, Nebraska, Chapter finds they have so much educational work to get caught up on that it becomes desirable to hold meetings every week during the winter months. Using the Educational Bulletins issued by the National Office as a basis of their program, the Chapter is securing a speaker each week to conduct the study of each bulletin.

In addition, problems, together with their solutions, are being presented in mimeographed form to each member, and discussed at the meeting. These questions, or problems, are of the everyday type gathered from anyone in or outside the Chapter.

The meetings are well attended and considerable interest is created.

PITTSBURGH CHAPTER

Meeting of January 14, 1938

By F. V. GOLITZ, *Secretary*
1109 Pemberton St., Pittsburgh, Pa.

THE meeting was held in the Commonwealth Building, with more than seventy members and friends present.

Election of a chairman for the Educational Committee resulted in the unanimous selection of Mr. N. D. Wagener.

President E. V. Black appointed the following men as chairmen of the committees listed: W. H. Barnes, *Cost—Standards;* D. R. Koontz, *Membership;* C. O. McCauley, *Entertainment.*

Johns-Manville Picture "Heat"

Secretary Golitz announced the scheduling of the Johns-Manville picture "Heat" as the educational feature of the February meeting.

The advisability of holding two meetings a month during the winter season was discussed at length. Further action was deferred until the next meeting and the Secretary was instructed to contact the building representatives to ascertain if the meeting room will be available for a second meeting.

PEERLESS "HUMIDI-PACK"
Model A2V

More For Your Money With

PEERLESS "HUMIDI-PACK"

HOUSEHOLD EVAPORATOR

The Peerless "Humidi-Pack" is the power pack of refrigeration. It maintains high box humidity so necessary for prevention of drying out of foods. It sets up a gentle, beneficial circulation of cool air throughout the food compartment of the box.

Here is refrigeration for household boxes comparable with the best of commercial installations:—plus, faster freezing of ice cubes, less defrosting, and ultra smart appearance.

You'll sell more because your customer gets more for his money.

PEERLESS of AMERICA, Inc.

ESTABLISHED IN 1912 AS THE PEERLESS ICE MACHINE CO.

New York Factory
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MAIN FACTORY : GENERAL OFFICES
515 West 35th St.
CHICAGO

Pacific Coast Factory
3000 S. Main St.
Los Angeles

Peerless Jobbers in all Principal Cities

The business meeting was adjourned after the members were given detailed instructions on the route to follow to the A & P warehouse. At that point Mr. D. R. Koontz acted as guide and the members and friends made a tour of the warehouse and inspected the cold storage rooms and the banana ripening and storage rooms. Samples of the ripened fruit were generously partaken of by the members of the party. The members were then conducted to the engine room, where the workings of the two 20-ton units were described by Mr. Koontz.

YOUNGSTOWN CHAPTER

Meeting of January 17, 1938

By MARTIN BOKESCH, JR., *Secretary*

THE meeting was called to order by President M. Bokesch.

It was moved, seconded and duly carried that the present active officers be retained for the coming year.

Due to the resignation of Mr. R. Davies, another sergeant-at-arms was chosen. Mr. J. Dallas Nutt was unanimously elected to this office.

Mr. C. P. Eich gave a talk on the educational program for the coming year. Messrs. C. P. Eich and M. Remaley were appointed on a committee to draw up plans for this program.

TRI-COUNTY CHAPTER

Meeting of January 10, 1938

By WILLIS STAFFORD, *Secretary*
726 Hinman St., Aurora, Ill.

THE minutes of the Board of Directors meeting were read and approved. Mr.

Cold Controls & Expansion Valves
repaired or exchanged at the following prices—F. O. B. Chicago

Automatic Expansion Valves (All Makes)	$1.25
Thermostatic Expansion Valves	3.00
Automatic Water Valves	2.50
Domestic Cold Controls (Modern Type)	2.00
Commercial Controls (Temp. or Pressure)	2.50
Commercial Dual Controls	3.00

ALL WORK GUARANTEED FOR 90 DAYS

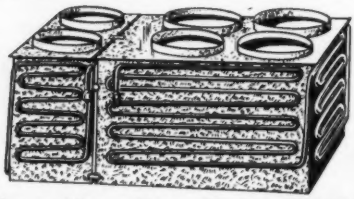
NEW DUTY
2424 Irving Park Blvd., CHICAGO

Ice Cream Cabinet Conversion Evaporators

All sizes for replacements

Easy to Install

Real Quality



Economical

Efficient Performance

Write for Bulletin and Price Sheet

Standard Refrigeration Co., 9 S. Clinton St., Chicago

NEW FAST DIRECT COOLING

COLTROL D-X

LIQUID COOLER

Also supplied in complete package unit, ready to plug in. See description page 14, January, 1938.

In the new COLTROL D-X the refrigerant contacts the coils directly—the fastest method of cooling, with the least temperature lag—Simple to install, easy to service. No moving parts.

COMMERCIAL COIL & REFRIGERATION CO.
459 North Artesian Avenue, Chicago, Illinois

. . SEE YOUR JOBBER OR WRITE DIRECT . .

E. White explained his recommendation that the office of secretary and treasurer be combined for the next year. The duties of these two offices are so closely related that it is a duplication of effort.

Officers for the year were then elected in the usual manner, with the following results: Eugene White, Elgin, *President;* Wm. Metcalf, Joliet, *Vice-President;* Willis Stafford, Aurora, *Secretary-Treasurer;* Cecil York of Downers Grove, *Sergeant-at-arms; Board of Directors:* B. V. Clark, Clarence Stumpf and Harold Anderson.

The four-point program recommended by the Board of Directors was discussed.

First: Some form of entertainment should be given, and the public invited, for the purpose of building up the chapter treasury.

Second: Building up the membership of the chapter in all three counties. Select a Membership Committee and instruct them to contact all the prospects possible. Mr. Cecil York was appointed chairman of the Membership Committee by President White. Mr. York chose two team captains—Mr. Clark Feeney and Mr. Art Wolff. A contest will be staged with two teams pitted against each other. The losing team has to buy the winners a dinner.

Third: The new officers should proceed

NOT EVEN ONE DROP OF WATER

IN A POUND OF *Artic*

DU PONT METHYL CHLORIDE

No moisture problems with Artic. It's bone-dry; and you can easily remove with a dryer moisture accidentally introduced in charging with a dryer. Artic is easy to service right in kitchen or store. Non-irritant. Operates at low, positive pressures. Doesn't corrode. And Artic is easy to hold; low pressures mean low leakage. You can always get Artic without waiting. Place your order today! And write for the helpful Artic Technical Booklet and the *Artic Service News.*

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MOTOR BRUSHES BEARINGS BUSHINGS

SHIPPED THE SAME DAY

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ELECTRICAL SPECIALTIES
128 No. Clinton St. Tel. Randolph 9117
CHICAGO

immediately with plans to form a state association, and cooperate fully with other chapters in the state and the National Society in forming new chapters in the state.

Fourth: Continue the educational program, presenting lectures and pictures on both commercial and domestic equipment. Mr. Stafford told of a plan for a meeting with the various grocers' organizations to promote our Society to them.

Mr. Wm. Metcalf was selected as chairman of the Entertainment Committee for the year, and Mr. Cecil York, chairman of the Membership Committee, appointed Messrs. Clark Feeney and Art Wolff to assist him on this committee.

CAPITAL CITY CHAPTER

Meeting of January 5, 1938

By **M. H. HAMILTON,** *Secretary*
1522 Isherwood St., N.E., Washington, D. C.

THE annual meeting of Capital City Chapter was held on January 5th for the purpose of electing new officers, which resulted as follows: Neil Matheson, *President;* V. S. Stegall, *Vice-President;* M. H. Hamilton, *Secretary-Treasurer;* Wm. Mahrley, *Sergeant-at-arms;* S. J. Brill, *Chairman of Educational Committee; Directors:* Charles Bielaski, Nathan Burdette, Donovan Matheson, Henry Miller and Edward C. Wooton.

A discussion took place regarding the Society's recommendation of certain schools and a communication from National Secretary H. T. McDermott was read wherein he called attention to Article X, Section 2, of the National Constitution and By-Laws which states that the Society "shall not sponsor, endorse, or recommend any firm, organization or service."

ST. LOUIS CHAPTER

Meeting of January 13, 1938

By **E. A. PLESSKOTT,** *Secretary*
2145 67th St., St. Louis, Mo.

A NOMINATING committee consisting of Mr. E. J. Eichorn, L. C. Haney and C. Ott, having been previously appointed, made known their selection of officers and members for the coming year. President E. Gygax advised those present that all eligible members were entitled to vote and hold office. The Secretary passed out ballots to all in good standing.

The election resulted as follows: L. L.

FOR COMMERCIAL USE

Mills Compressors

★ Mills Novelty Company
4100 Fullerton Avenue, Chicago, Illinois

SOLD ONLY THROUGH SERVICEMEN, DEALERS, AND DISTRIBUTORS

Vollman, *President;* E. C. Fix, *1st Vice-President;* O. H. Gerken, *2nd Vice-President;* E. A. Plesskott, *Secretary-Treasurer;* Wm. Steinkamp, *Sergeant-at-arms; Directors:* O. Petri, E. J. Eichorn, A. H. Huhn. *Educational Committee Chairman,* E. Gygax.

President L. L. Vollman expressed the hope of having the cooperation of the members and officers that was given his predecessor, and said he would do all in his power to further the good work.

CENTRAL INDIANA CHAPTER

Meeting of January 26, 1938

By **FRANK WHETSEL,** *Secretary*
321 Milton Ave., Anderson, Ind.

THE regular monthly meeting of the chapter was held on Jannary 26th in the Indiana General Service Company's building in Marion.

Meeting was opened at 8:00 P. M. by President Vern Nold and the entire evening devoted to the task of setting up certain standards for service and installation work and the figuring of time on various jobs.

The study proved of great interest to the members and we believe that when finished it will also prove beneficial.

All dealers and service men in this community will be invited to contribute and participate in this fair trade arrangement.

It was also decided that on March 15th the chapter will have a supper party and a joint meeting with the ladies.

MISSISSIPPI VALLEY CHAPTER

Meeting of January 14, 1938

By **E. L. BENGSTON,** *Secretary*
116 E. First St., Davenport, Iowa

ELECTION of officers was held, which resulted as follows: Leonard Nelson, *President;* C. L. Hartman, *Vice-President;* E. L. Bengston, *re-elected Secretary;* Fred Tindall, *re-elected Treasurer;* John Ven Horst, *Sergeant-at-arms; Board of Directors:* H. J. McChesney, Ed M. Dick, Robert F. Spiker.

Mr. Art Russ was elected chairman of the Educational Committee, with members to serve as follows: Otto Balke, Clarence Teagarden, E. J. Soens, Alfred I. Rittenhouse, Frank Wolcott.

Mr. A. B. Munchrath, who was elected chairman of the Entertainment Committee,

Send today for HARRY ALTER'S
DEPENDABOOK
The latest and finest in refrigeration and air conditioning parts, tools and equipment.
• Our large stocks permit prompt shipment at lowest prices.
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DEPENDABOOK
EVERYTHING FOR
REFRIGERATION
IN 1938
HARRY ALTER CO.
Just Off
The Press!
If you have not received your latest 1938 copy of the Harry Alter DEPENDABOOK, write for it today on your letterhead.
BRANCHES: NEW YORK—CLEVELAND—ST. LOUIS
THE HARRY ALTER CO.
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has Messrs. I. W. Waage, R. H. Williams, Lonnie Fish, C. D. Kaufman, and W. T. Cawiezell to assist him.

For the next meeting each member is to write a question which is to be answered by a member selected by the President.

Motion was made and carried that each member be assessed twenty-five cents per entertainment to help defray the expenses of same. The surplus is to be placed in a separate fund for entertainment purposes.

A motion was carried instructing retiring President J. L. Fish to write Mr. Kimmel of the Republic Electric Company thanking him for the use of their building for our meetings for the past year.

Meeting of January 28, 1938

The regular meeting of the Mississippi Valley Chapter No. 1 was held on January 28th at the Republic Electric Company Building, with members in attendance from Galesburg, Kewanee, Iowa City and Cedar Rapids.

At the Davenport Hotel the ladies met and formed an auxiliary, and the following officers were elected:

President—Mrs. Marie Bengston, Rock Island, Ill.

Vice-President—Mrs. Georgie Teagarden, Galesburg, Ill.

Secretary—Mrs. Harriet Berberet, Davenport, Iowa.

Treasurer — Mrs. Florence McChesney, Sterling, Ill.

Sergeant-at-arms—Mrs. Pearl Dick, Davenport, Iowa.

Entertainment Committee

Chairlady—Mrs. Margaret Tindall, Davenport, Iowa.

Mrs. Rose Willetts, Rock Island, Ill.

Miss Flora Whan, Rock Island, Ill.

Mrs. Eileen Nelson, Galesburg, Ill.

The ladies are to hold their meetings every second and fourth Fridays of each month.

MADISON CHAPTER

Meeting of January 4, 1938

By **A. J. MEINKE**, *Secretary*
1639 Monroe St., Madison, Wis.

THE meeting was called to order by Chairman H. A. Struthers.

A discussion on the election and the naming of a Nominating Committee took place, and Mr. Otto Johr was elected chairman, with two members: Mr. G. A. Larson and George Poster.

WHAT'S IN A NAME?

For over a third of a century the brand name, CESCO, has meant to American Industry—quality and efficiency in Safety Equipment at moderate cost.

HEALTHGUARD FUME KIT

is an example. This device is the product of modern design, painstaking manufacture, and the finest materials. It fits snug, does not bind, is light, easily portable, and gives absolute protection to eyes, nose, throat and lungs. And that is not all—it is inexpensive. Comes equipped with cartridges for Methyl Chloride, Ammonia, Sulphur Dioxide. Write for Prices.

CHICAGO EYE SHIELD CO.

2341 Warren Boulevard **CHICAGO, ILL.**

Mr. Messner reported he had found a meeting room would be furnished free by the Capital Hotel, and the members decided to accept this offer.

Mr. G. A. Larson introduced Mr. Marc Shantz of the Fedders Manufacturing Co. who had come to Madison from Chicago for this meeting. The meeting was turned over to Mr. Shantz and he gave some good instructions and educational features in his talk. Mr. Shantz's display was well received and appreciated by the chapter.

Meeting of January 18, 1938

The meeting was called to order in the new meeting room at the Capital Hotel, by Chairman H. A. Struthers.

After the regular business had been dispensed with, the Nominating Committee gave the suggested names for the various offices. These names were duly voted upon and the results were as follows: Mead Robertson, *President;* H. A. Struthers, *1st Vice-President;* Jerome Quam, *2nd Vice-President;* Phil Noth, *Secretary;* E. R. Steinkraus, *Sergeant-at-Arms; Directors:* A. J. Meinke, Otto Johr, Ray Hoffman.

Discussions followed on various phases of service finances, especially means of collecting bills, proper ethics for each member to use in his business relations with his business competitors and customers.

S S S

TRI-STATE CHAPTER

Meeting of January 3, 1938

By **A. W. ALBERTSEN,** *Secretary*
206 8th Ave., W., Huntington, W. Va.

THE meeting was called to order by President Claude Brunton at 8:15 P.M.

All officers and members signed a copy of the constitution and by-laws prepared by the Secretary and incorporated in the minutes of the December 6th meeting.

The applications of Donald M. Young, Carl Ackley and Bill Roote were presented, and all were elected to membership.

Lapel buttons and other materials available to members from the National Society were passed around for inspection.

Interesting discussions followed on dryers, dryer agents and leak detectors.

Meeting of January 17, 1938

At 8:10 P.M. the meeting was called to

Snap-on

SPECIALIZED TOOLS FOR REFRIGERATION SERVICE

When a radio quits—waiting for service doesn't cost its owner money. But when a refrigerator stops, there's a definite loss, for food spoils.

Equip with Snap-on! Have every tool you need to finish every job on a single call . . . at low cost to the owner and with great advertising to yourself. The Snap-on line is complete, sturdy and specialized for just your special work.

Available only through our own branch distributing warehouses located in 37 principal cities. See "Snap-on Tools Corporation," in your telephone directory or send coupon.

R-200B SET. One piece forged ratchet with ¼" square opening for work on valve stems. 1½" extension, 2 adaptor plugs, 1 Kerotest valve packing nut socket, 5 square valve stem sockets, 5 packing gland nut sockets and 3 double-broached Ferret sockets. Complete in metal box.

Snap-on Tools Corporation
Kenosha, Wis.

☐ Send FREE literature.
☐ Show me Set R-200B.

Name.....

Address.....RSE-2

order by President C. Brunton. Roll call found all but one member present, and also twelve visitors present, all of whom were prospective members.

The applications of George P. Kaut (active) and J. S. Kitchen (associate) were presented by the Membership Committee, and both gentlemen were elected to membership.

For the benefit of the visitors present, President Brunton gave a very fine outline of the history and advantages of belonging to the Society.

For an educational feature, through the courtesy of Ranco, Inc. of Columbus, Ohio, we had the pleasure of hearing Mr. R. A. Cook present Ranco Controls. At the conclusion of his talk Mr. Cook presented each man present with a new Ranco Service Manual and a stainless steel rule and pressure temperature chart.

After Mr. Cook's talk, President Brunton asked Mr. Thackston of the Thackston Brothers Tire Company for a short talk. He was followed by Mr. Roy McElhaney of the Mechanical Refrigeration Supply Company, and Mr. Harry Watts, service manager of the Emmons Hawkins Hardware Company.

MISSOURI VALLEY CHAPTER

Meeting of January 6, 1938

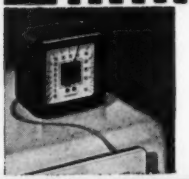
By P. O. JONES, *Secretary*
207 No. 16th St., Omaha, Nebr.

THE meeting was called to order by President C. J. Doyle at 8:30 P.M.

The following four applications for membership were turned over by the Membership Committee for vote: Vincent E. Kauffman of the Baker Ice Machine Co., associate membership; George Sebree of the Western Air Conditioning Co., associate membership; Clayton Douglas of Shenandoah, Iowa, active membership; Gene Parker of Harlan, Iowa, active membership.

President C. J. Doyle then turned the meeting over to the chairman of the Educational Committee, Mr. Austin Jones. Mr. Jones announced that he had chosen Mr. Vincent Kauffman of the Baker Ice Machine Co. and Mr. Nicholas Vertefeuille as the two members of his committee. Mr. Jones then introduced the guest speaker of the evening, Mr. C. F. Flohr of the United Motors Service Co., who gave an interesting talk on electric motors used in refrigeration. After his talk, Mr. Flohr answered questions of the members.

MARSH *Refrigeration Instruments*



THE Marsh "Serviceman" Refrigeration Service Thermometer eliminates all the guesswork of a pocket thermometer in service work. It gives you an accurate, easily read, *remote* reading in the proper way —with a closed door. There is plenty of tubing to reach point of testing, neatly compacted into the case. Guaranteed within one degree—has "Recalibrator" to *keep* it accurate. Use it for servicing all jobs, household and commercial, also in selling refrigerators. Sold in —10° to +65° or —10° to +100° ranges at remarkably low dealer's net price of $5.00 f. o. b. factory. (Subject to change without notice.)

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● The gasket illustrated was made especially for BOHN replacement. It fits. ALL JARROW gaskets are built to manufacturers specifications.

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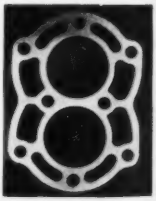
420 N. LaSalle St., Chicago, Ill.

REPLACEMENT GASKETS FOR ALL MAKES

Metallic Gaskets that hold regardless of what the refrigerant may be and will not shed particles of material to clog up important working parts in a machine.

Send for catalog listing many "orphans" not available elsewhere.



CHICAGO-WILCOX MFG. CO.
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A guest, Mr. J. F. Wickham of Lincoln, Nebraska, was introduced by President Doyle. Mr. Wickham briefly told of the service organization in Lincoln and invited members of the Missouri Valley Chapter to attend any meetings of the Lincoln group.

President Doyle made the suggestion that a question box be inaugurated into the meetings of the chapter to give the members an opportunity to discuss any problems they may have. This suggestion was favorably received by the members and it was decided to place the box at the door of the meeting room, into which members could drop unsigned questions which would later be read and discussed.

Mr. A. Jones brought up the subject of taking the examination for Certificate Membership. This subject was discussed at length and it was decided that the Educational Committee go over the past Lecture Courses of the National Educational and Examining Board at the next two or three meetings before dates be decided upon.

A motion was made by Mr. T. Cherry that a meeting be held every week during the winter months. The motion was passed. It was decided that the Secretary advise the members the place of the next meeting which is to be held Thursday evening, January 13th.

The United Motors Service offered the Society the use of their meeting room for any of its meetings. Mr. William H. Beumer, who made the offer and who was a guest at the meeting, was introduced.

Meeting of January 13, 1938

The chairman called on committee chairmen to name members of their committees with the following results.

Educational Committee, Chairman, Austin Jones, V. E. Kaufman, Nicholas Vertifeuille.

Investigating Committee, Chairman, E. C. Hamilton, Gordon Lozier, Berthold Becker.

Membership Committee, Chairman, D. W. Schuneman, Fritz Haeberlein, Gilbert Eacker.

Visiting Committee, Chairman, Karl Krumrei.

Public Relations Committee, Chairman, T. R. Cherry, George Sebree, T. E. Potter.

Entertainment Committee, Chairman, O. F. Larson.

Finance Committee, Chairman, Jess Hart.

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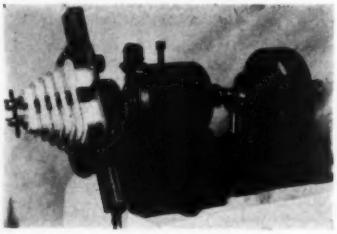

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Supplies Committee, Chairman, Charles Martinson, H. H. Wilke, Ben Lewis.

Bulletin Committee, Chairman, T. E. Potter.

The meeting was turned over to the Educational Committee. Mr. Nicholas Vertifeuille, the first speaker, had as his subject Lecture 1 of the National Educational Board's lectures. Mr. Kaufman read and discussed the second of the National Association's lectures. The third was read and discussed by Mr. Jones.

Meeting of January 20, 1938

The meeting was turned over to the chairman of the Educational Committee, Mr. Austin Jones, who introduced the guest speaker of the evening, Mr. Van Morris, president of the Engineers Club of Omaha. Mr. Morris discussed the lecture on simple refrigeration systems and gave and worked out a practical problem in air conditioning. Copies of this problem and its solution were distributed to the members.

A motion was made and carried that the Public Relations Committee draw up a skeleton code to be presented to the chapter within thirty days. Mr. C. Krumrei amended the motion to read that a skeleton code be presented to the chapter within fifteen days. Amendment passed.

The president started a discussion on a party to be given by the chapter for members and their wives to be held on a Saturday night. The committee is to arrange for the party to be held at a place where the room will be furnished with the dinner.

CHICAGO CHAPTER

Meeting of January 11, 1938

By **WILLIS STAFFORD,** *Secretary*
726 Hinman St., Aurora, Ill.

PRESIDENT I. SKIPPLE read the following letter from Mr. Stafford:

Dear Mr. Skipple:

It is with a great deal of regret that I compose this letter to end my association with Chicago Chapter. It has indeed been a pleasure to be associated with the chapter that has been the cradle of this Society.

I have enjoyed being your Secretary for the last year-and-a-half, and I know that I will profit greatly by the experience.

The officers and members have been exceptionally fine in their cooperation with me in conducting the affairs of the Secretary's office, and I wish to take this oppor-

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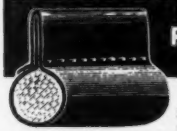
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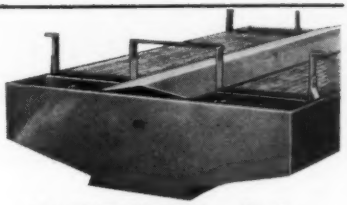

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tunity to extend my appreciation to everyone.

The Tri-County Chapter is located in my territory and I feel that from a business and social standpoint all of my time should be devoted to this chapter. I, therefore, apply to you for a transfer to the Tri-County Chapter of Illinois.

It is my hope that I may be welcome to attend Chicago Chapter meetings whenever possible and receive the benefits and education that has always been derived from these meetings.

With best wishes for the continued success of the Chicago Chapter, I remain

Yours truly, Willis Stafford

A motion by Mr. Irving Alter, seconded by Mr. Vanston, was carried, that the request for transfer be given, and a standing vote of thanks be given Mr. Stafford.

Mr. Skipple selected the following men to act on the Nominating Committee: Steve Archie, *chairman;* George Franck and Fred Twiss.

As there were no further nominations for any office other than those names proposed by the Nominating Committee, with the exception of the Board of Directors, a motion was made by Mr. Vanston that the Secretary cast one unanimous vote for all the offices with the exception of the Board. The ballots were then cast, with the following results: Fred Roth, *President;* Percy Bossert, *1st Vice-President;* Fred Twiss, *2nd Vice-President;* Joseph Corso, *Treasurer;* Harry DeGan, *Sergeant-at-arms; Board of Directors:* Herman Long, George Monjian, Ivar Skipple. Chairman of the Educational Committee: Ralph Vanston.

After considerable discussion it was decided to continue this meeting for two weeks so the constitution may be amended in accordance with Mr. Herman Goldberg's motions, as follows:

First: That Article VII of the constitution be changed to read that the Board of Directors be composed of five members in good standing.

Second: That Article V, Section 3, of the by-laws be changed to read that two associate members may be elected to the Board of Directors.

The meeting was recessed until January 25th.

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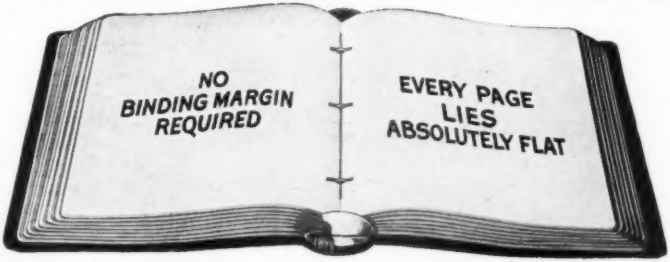

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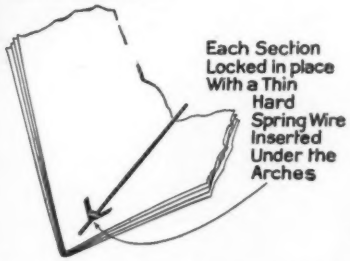

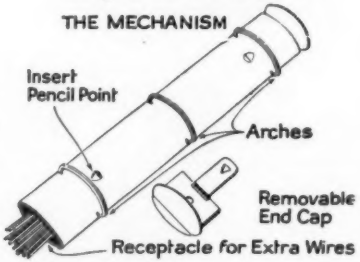

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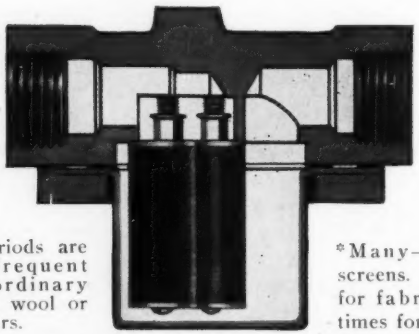

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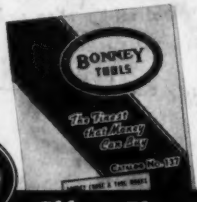

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